ELECTRICAL TIMES

THURSDAY
3 MAY
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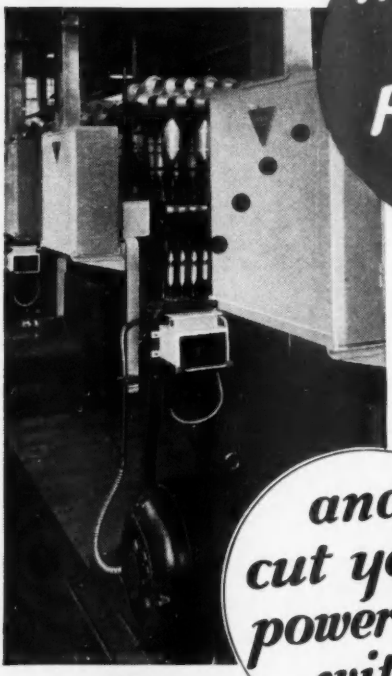

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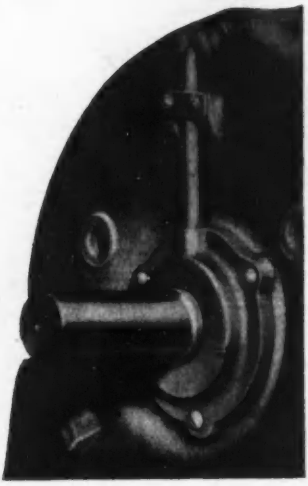

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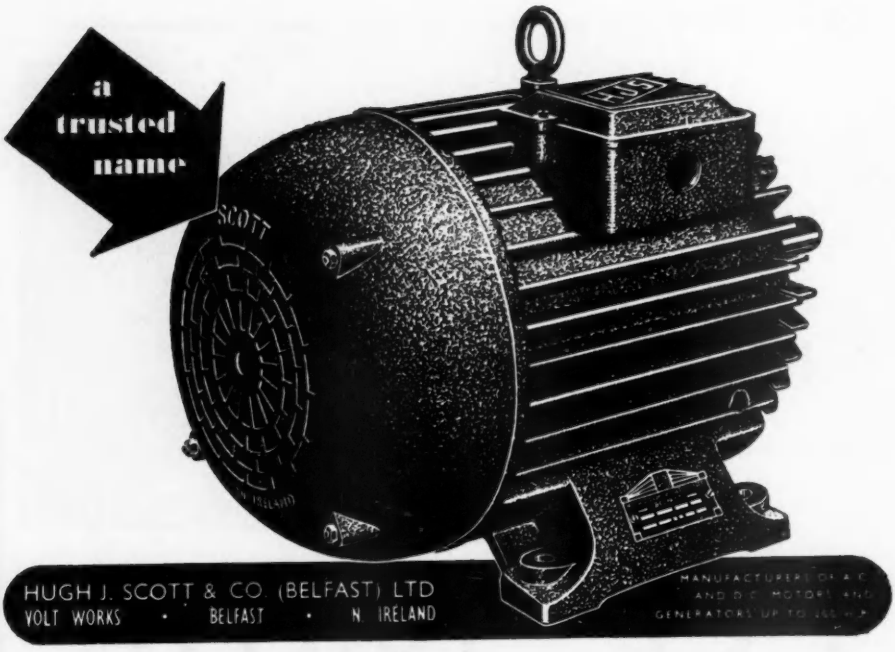

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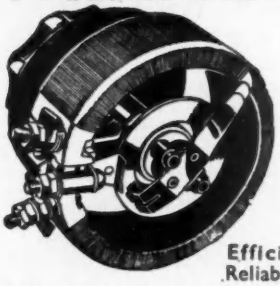

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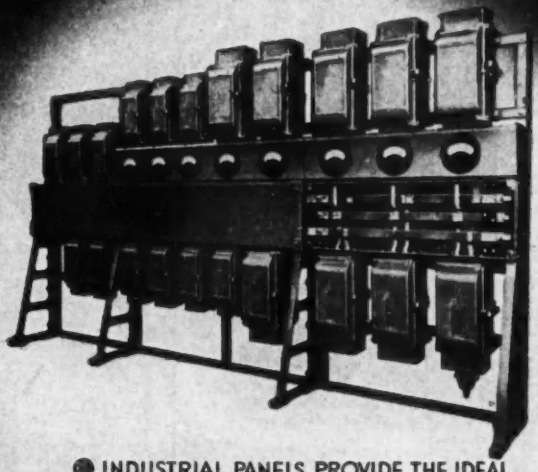

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Raleigh's gallant effort

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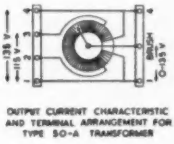
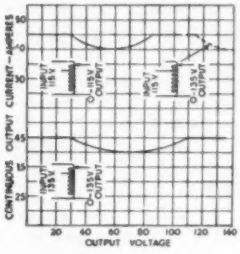
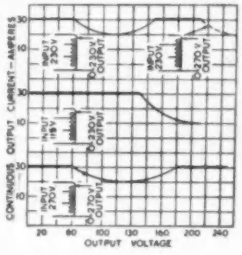
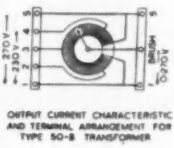


OUTPUT CURRENT CHARACTERISTIC AND TERMINAL ARRANGEMENT FOR TYPE 50-A TRANSFORMER







OUTPUT CURRENT CHARACTERISTIC AND TERMINAL ARRANGEMENT FOR TYPE 50-B TRANSFORMER

SPECIFICATIONS							
TYPE	LOAD RATING	INPUT VOLTAGE	CURRENT		OUTPUT VOLTAGE	NO-LOAD LOSS	NET PRICE £ s. d.
			RATED	MAXIMUM			
50-A	5 kva.	115 v.	40 a.	45 a.	0-135 v.	65 watts	44 18 6
50-B	7 kva.	230/115 v.	20 a.	31 a.	0-270 v.	90 watts	44 18 6

SERIES "50" VARIAC TRANSFORMERS

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TYPE 50-B

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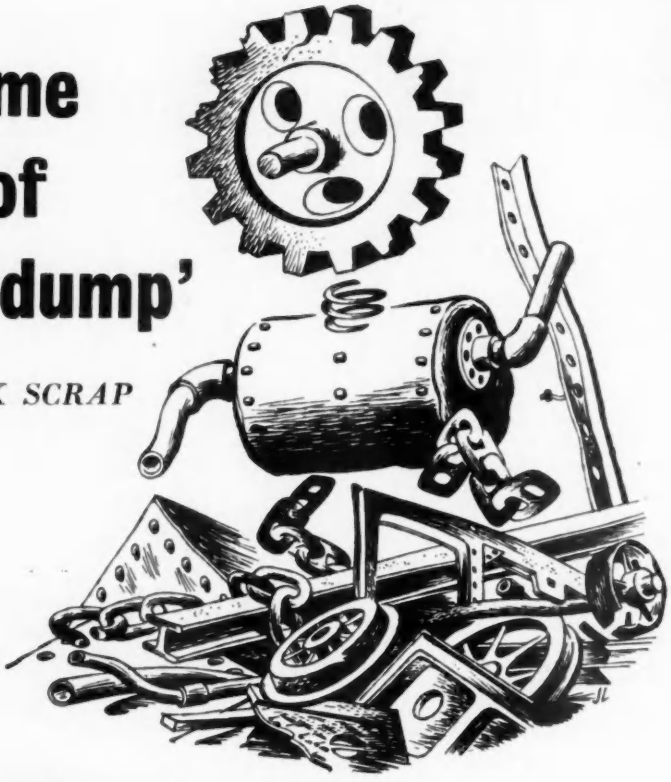

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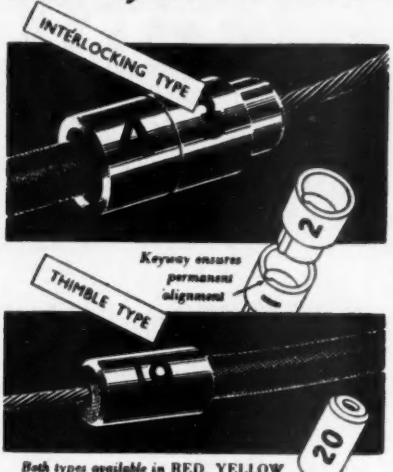

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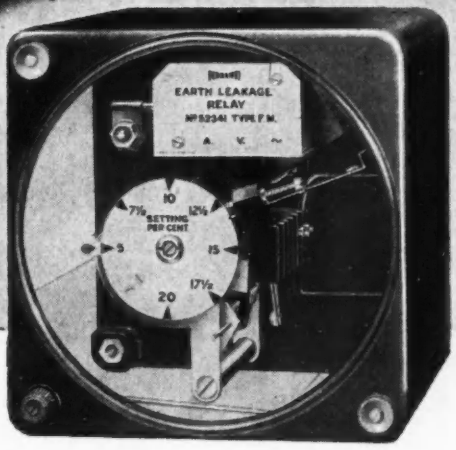

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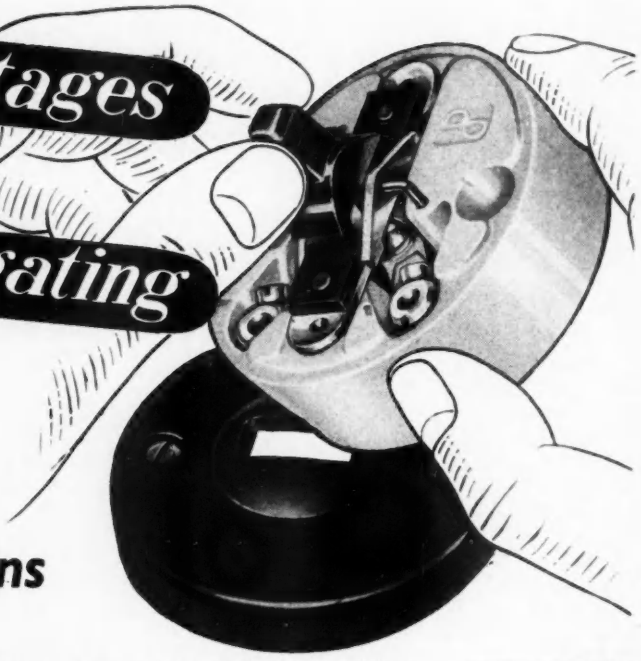

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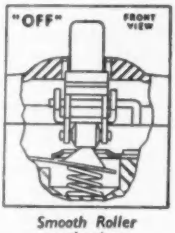
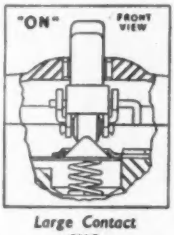


Smooth Roller mechanism.



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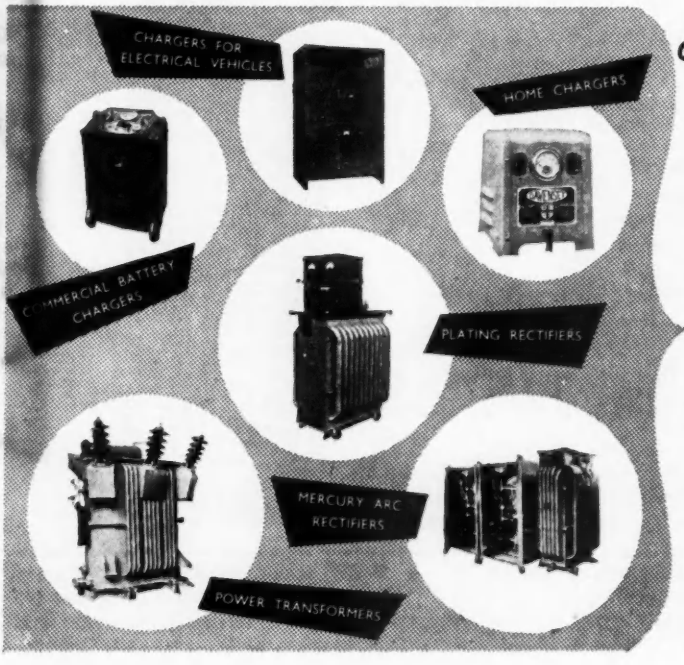

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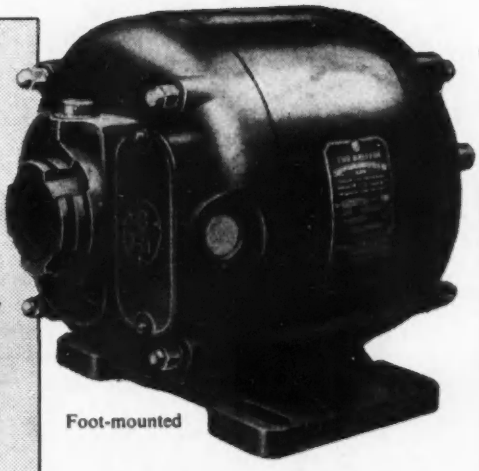

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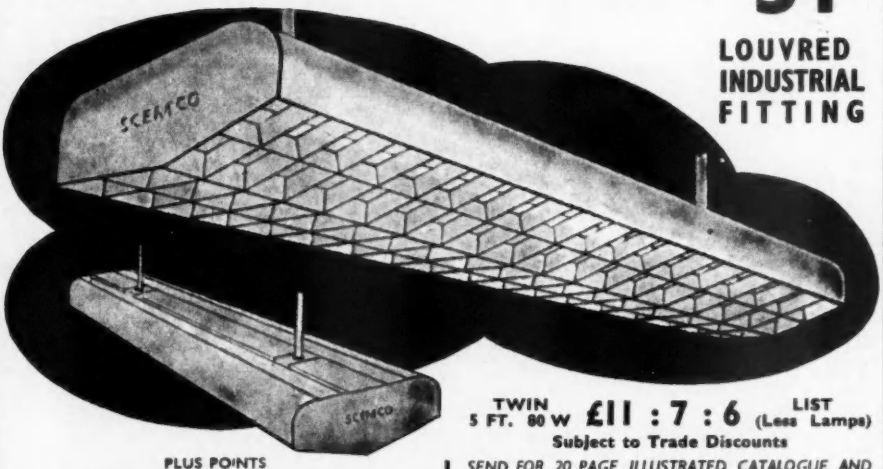

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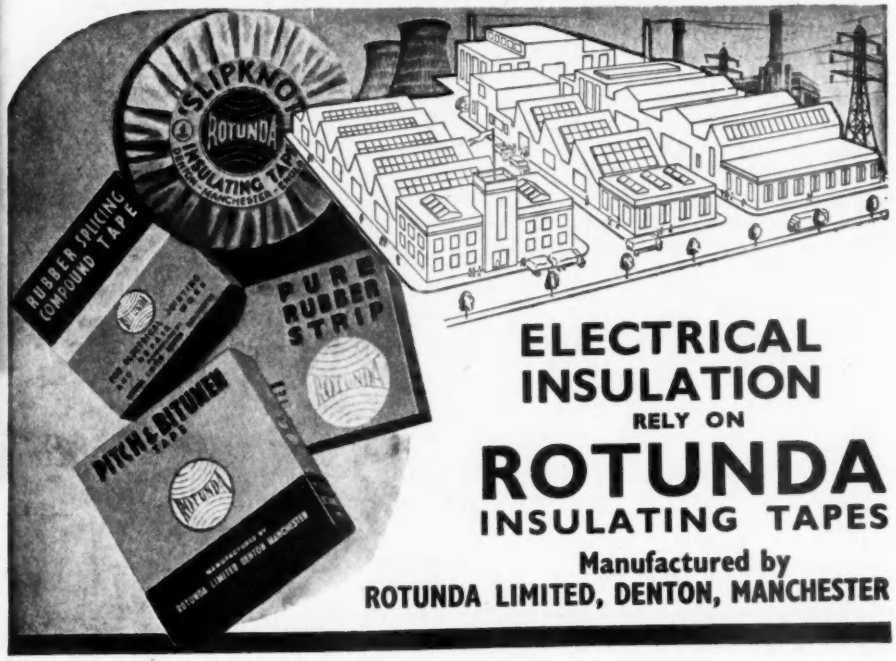

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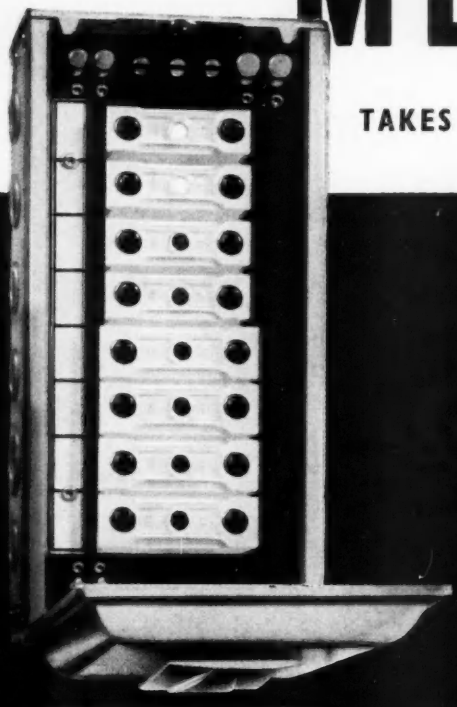

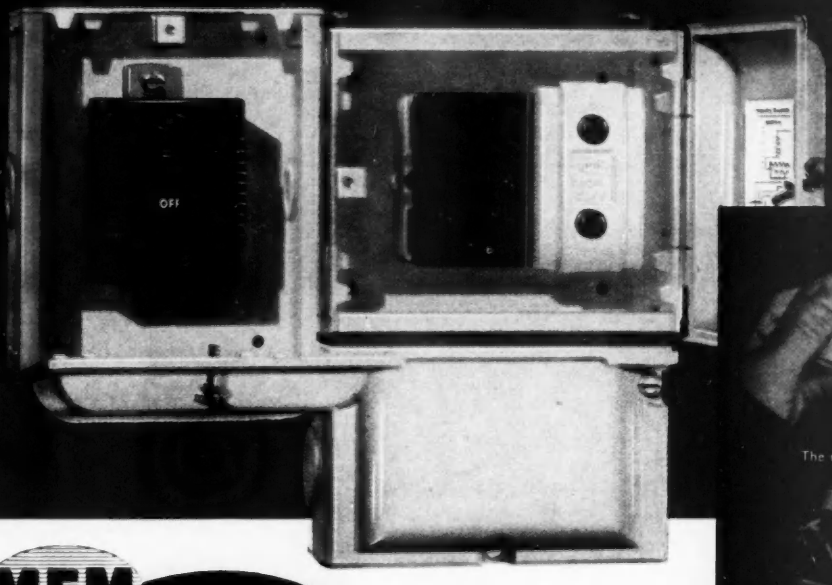

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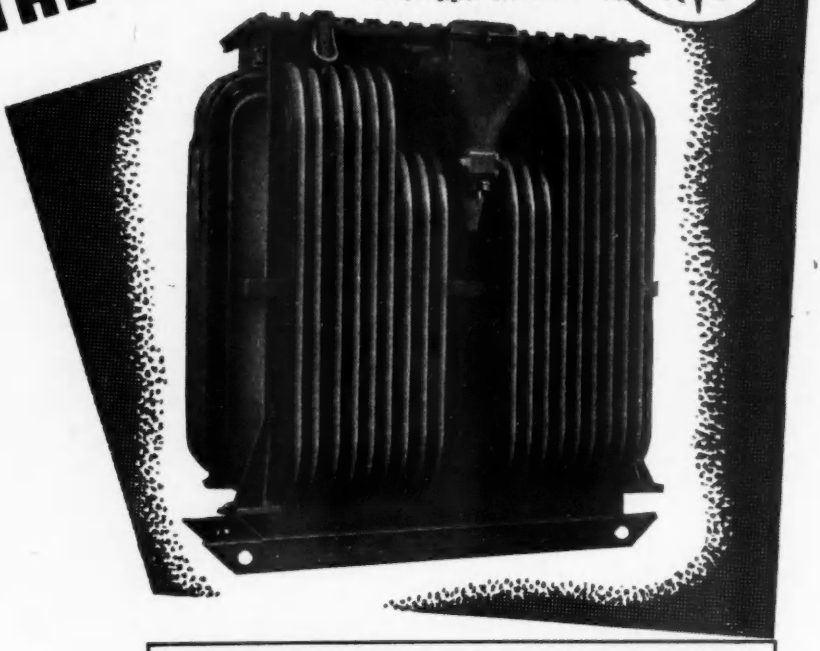

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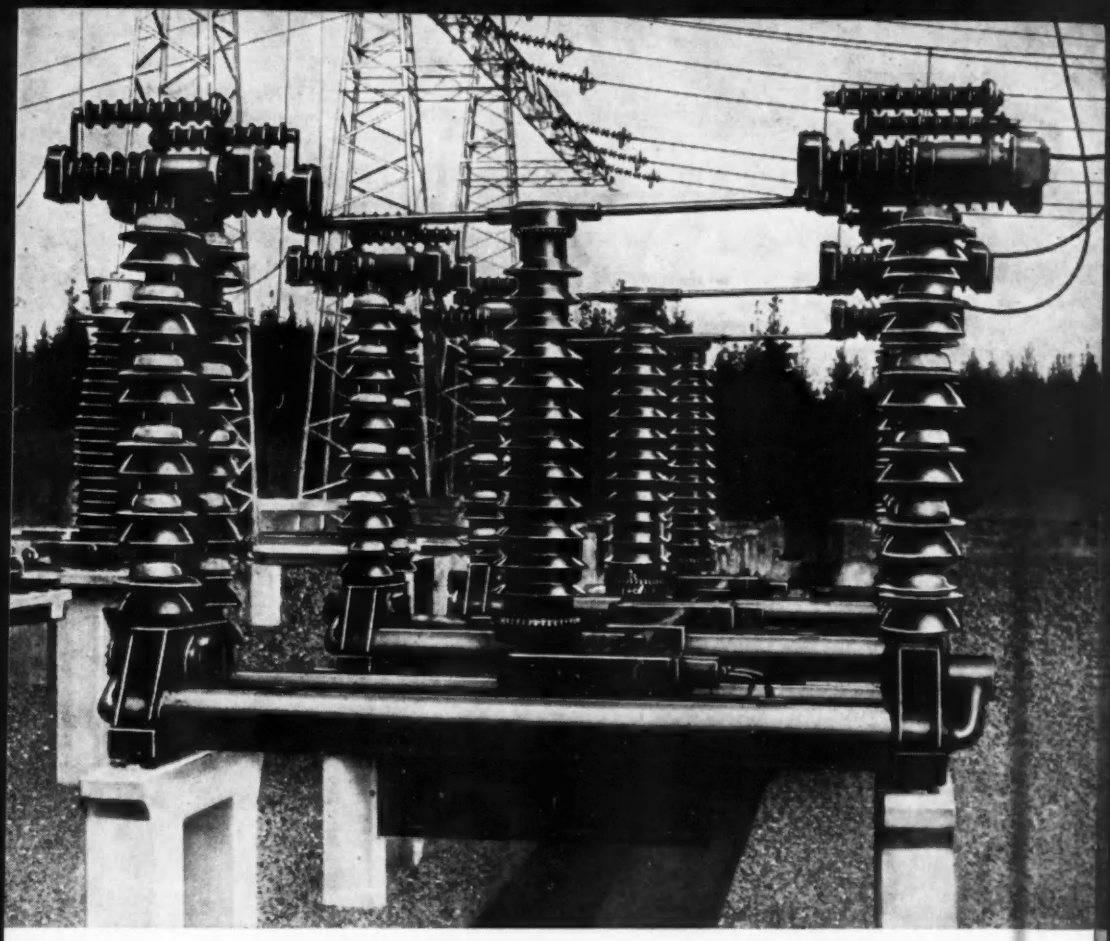

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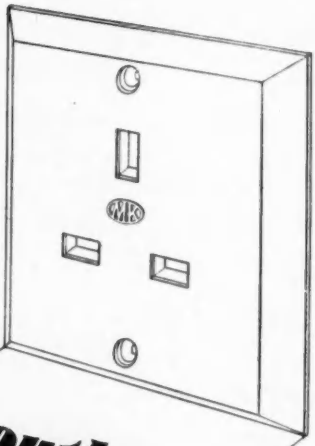
The first British-built 220kV air-blast circuit-breakers for commercial service have now been installed in Finland by Metrovick. These circuit-breakers clear a fault within 0.07 seconds of trip impulse and are designed to reclose automatically after a "dead time" adjustable between 0.25 and 0.4 seconds.
The experience gained from the manufacture and installation of these equipments has been applied to the design of circuit-breakers for 275kV and higher voltage transmission systems.

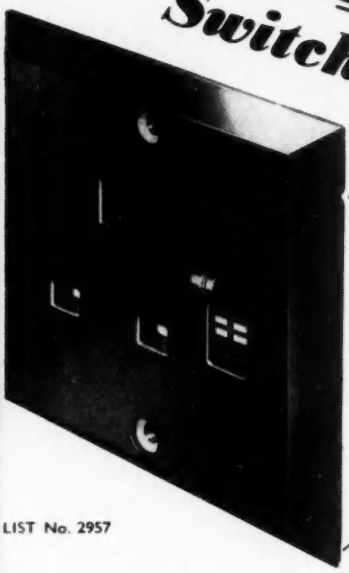
METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17
Member of the A.E.I group of companies

METROVICK *Switchgear for all climatic conditions*

LIST No. 730



NOW – M.K. 13 amp Switchsocket-outlets



LIST No. 2957

Even the most enthusiastic advocates of B.S. 1363 could hardly have foreseen the extent to which the new standard would be adopted in a matter of only three years. From Perth to Penzance, from Lowestoft to Llandudno 13 amp. plugs and sockets have been specified and installed. Practically every new dwelling has them, and most of them were made at Edmonton. 730 is a number well-known to contractors all over the Country, for 730 is the most popular 13 amp. socket today. And now we are introducing a switched version of the 730. We are sure it will merit an equal popularity where specifications call for 13 amp. *switch*sockets. Make a note of the number — 2957.

Steel Box to B.S. 1363: 1947 for 13 amp. flush types — M.K. List No. 885. Also in this range :— List No. 2959 — 13 amp. Surface All-Insulated switchsocket. List No. 2977 — 13 amp. Surface Metalclad switchsocket in drawn steel seamless box.

M.K. ELECTRIC LIMITED

WAKEFIELD STREET, EDMONTON, LONDON, N.18

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A39

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(above)
100 kVA, 3-phase, 50 cycles. Voltage ratio 11,000/500 Delta/Star fitted with off-load switch. H.T. Outdoor bare type terminals and arcing horns.
L.T. Outdoor bare type terminals. Thompson Relief Chamber and Protective cover.

(on right)
FOR TROPICAL USE.
1,500 kVA, voltage ratio 6,600/433 volts. Thompson Relief Chamber and Protective Cover.

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THE LINDLEY THOMPSON TRANSFORMER & SERVICE CO. LTD., ST. MARY'S ROAD, MIDDLE GREEN, SLOUGH, BUCKS. 'PHONE: LANGLEY (Bucks) 200/201.

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- **FLEXIBLES.**

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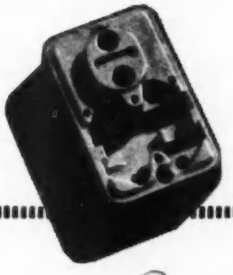
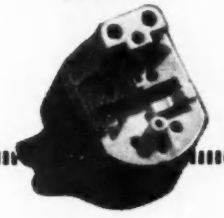
THE GENERAL CABLE MANUFACTURING CO. LTD. LEATHERHEAD. SURREY.

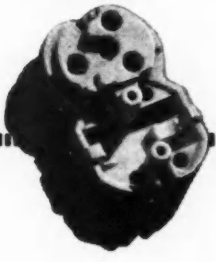
TELEPHONE: Leatherhead 3021 (4 Lines) TELEGRAMS: Isolde, Leatherhead.



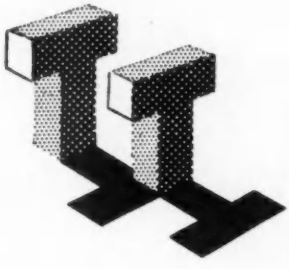
porcelain



die-pressed



insulators



Our long experience as manufacturers of die-pressed porcelains for all electrical accessories is at your service.

The 'T.T.' Trade mark is a safeguard of good quality for all electro-ceramics, whether H.V. or L.V. insulators, refractories for electrical heating elements, H.F. ceramics etc., etc.

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5,000 hours of bright light!

No extra cost!

ATLAS "*double-life*" LAMPS SLASH FLUORESCENT REPLACEMENT COSTS BY 50%

The ATLAS "*Double-Life*" fluorescent lamp lasts twice as long! In another giant stride, the normal efficient life of ATLAS Fluorescent lamps has been raised to 5,000 hours.

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Especially so, because not only have they *doubled the normal life of fluorescent lamps*, but have *maintained the average efficiency* AT NO EXTRA COST

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ATLAS FOR *double* STAYING POWER

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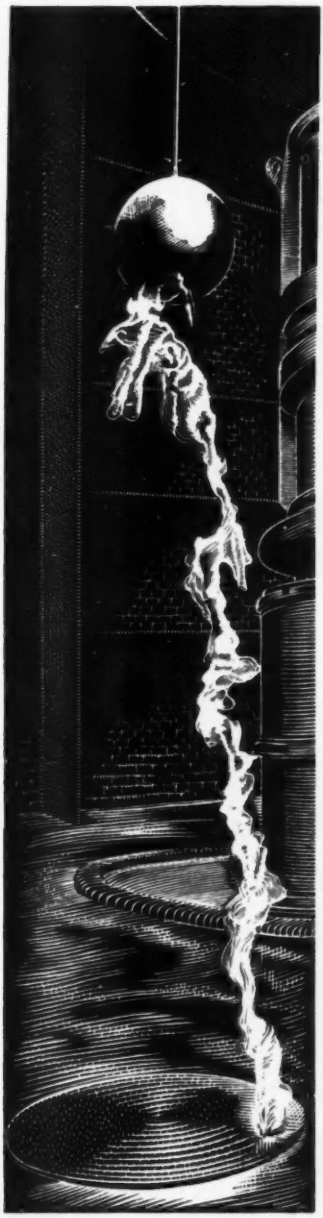

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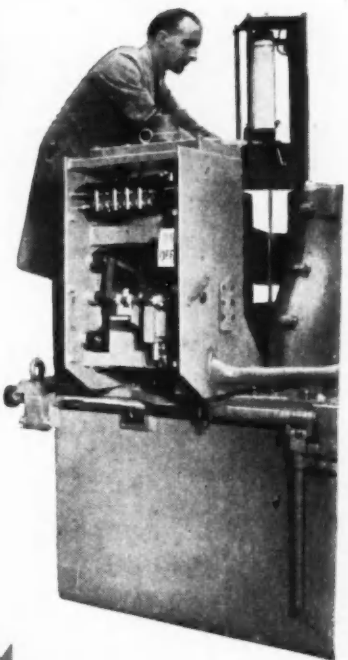

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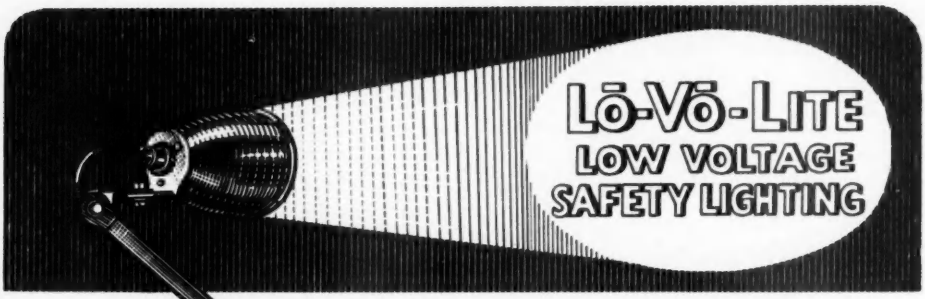
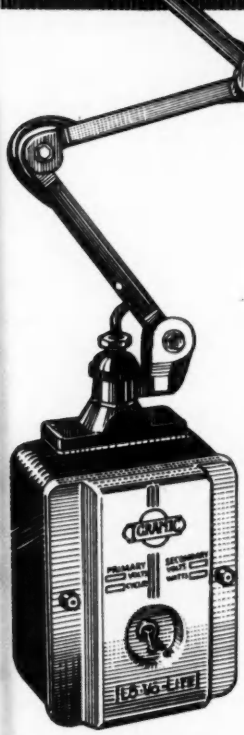
SWITCHGEAR

CRC 35





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Transformer - Switch - Fuse Units and Lighting Fittings are fully described in Publication 68610Z1.

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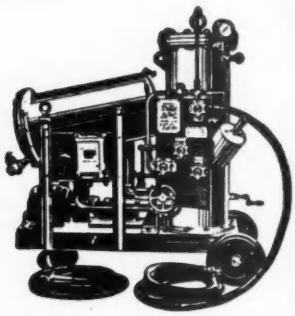

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10 mm. to 1 ft. fine scale models of the British Railways (Western Region) experimental gas-turbo-electric locomotive and typical electric freight locomotive for metre gauge.

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Engineering at its best

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A/A109

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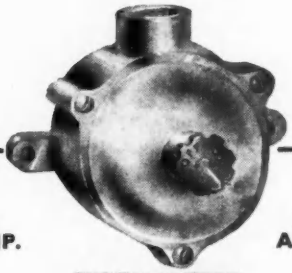

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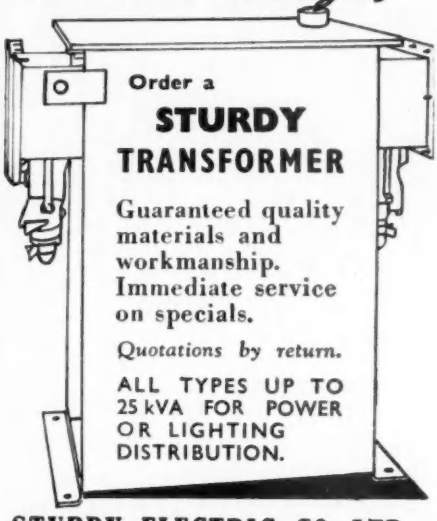

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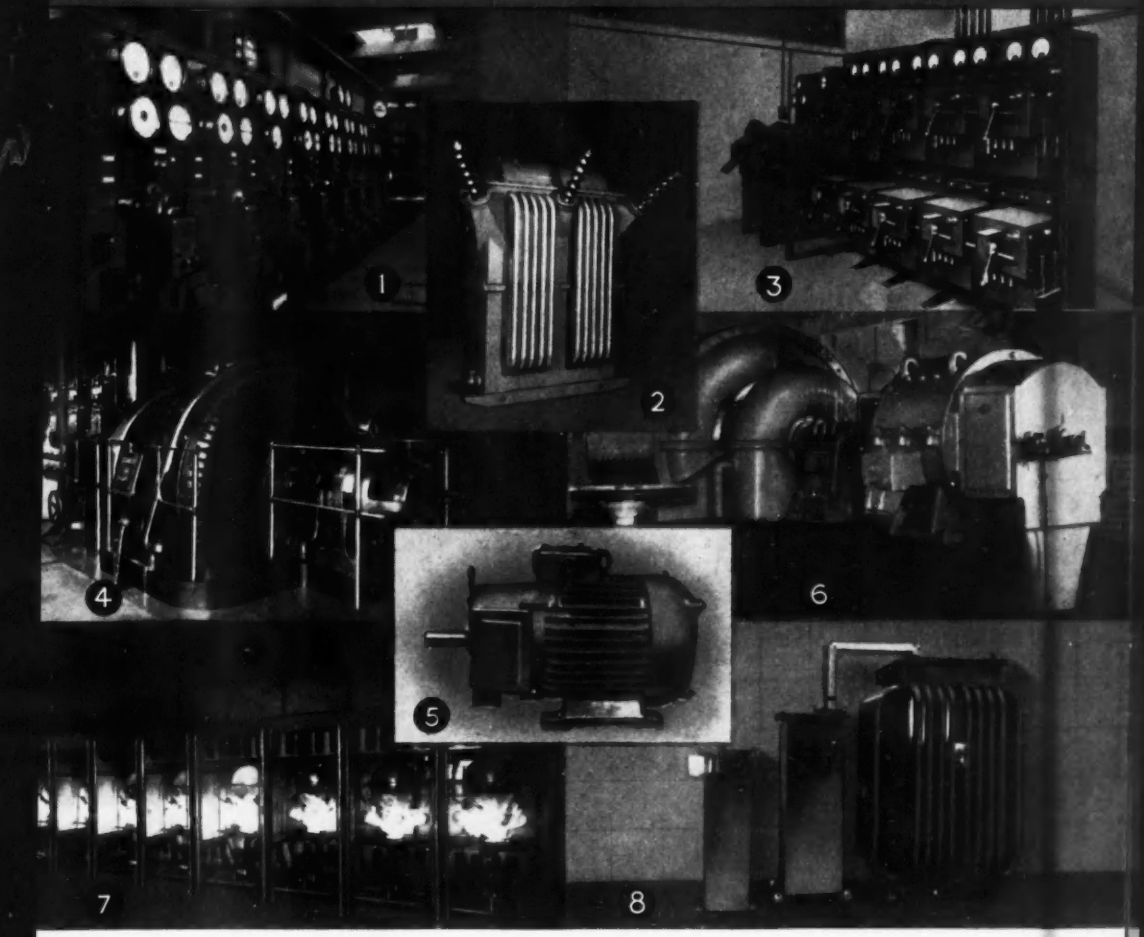

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● Removable Endplates Facilitates Drilling

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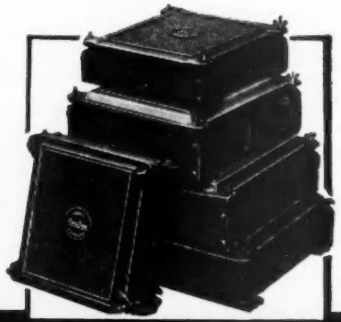

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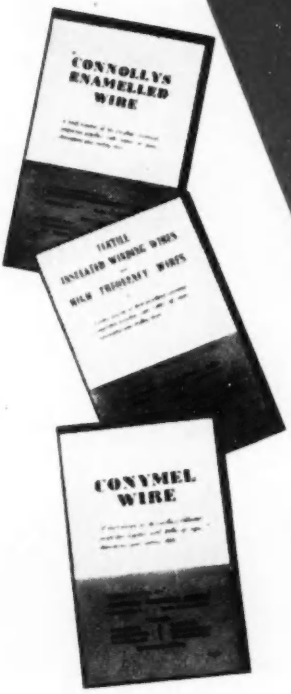

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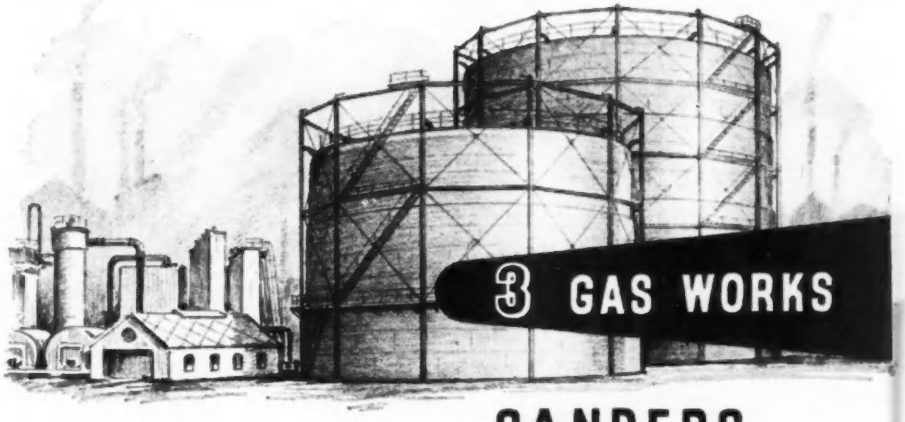

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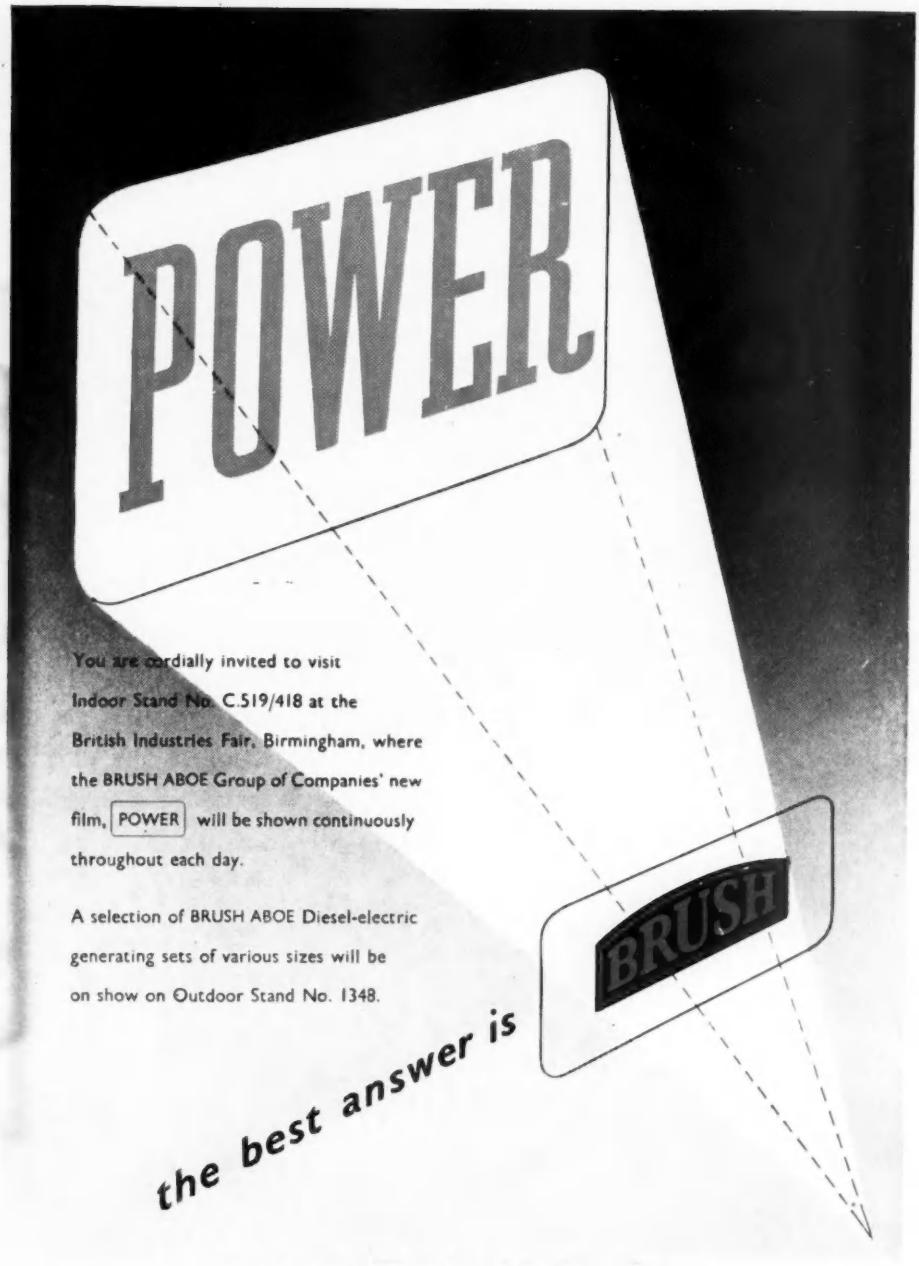
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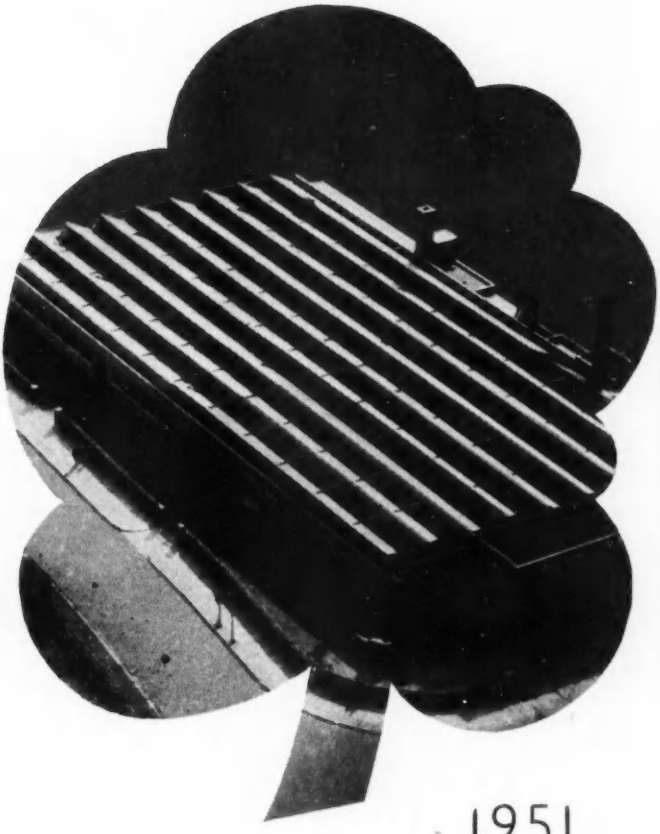

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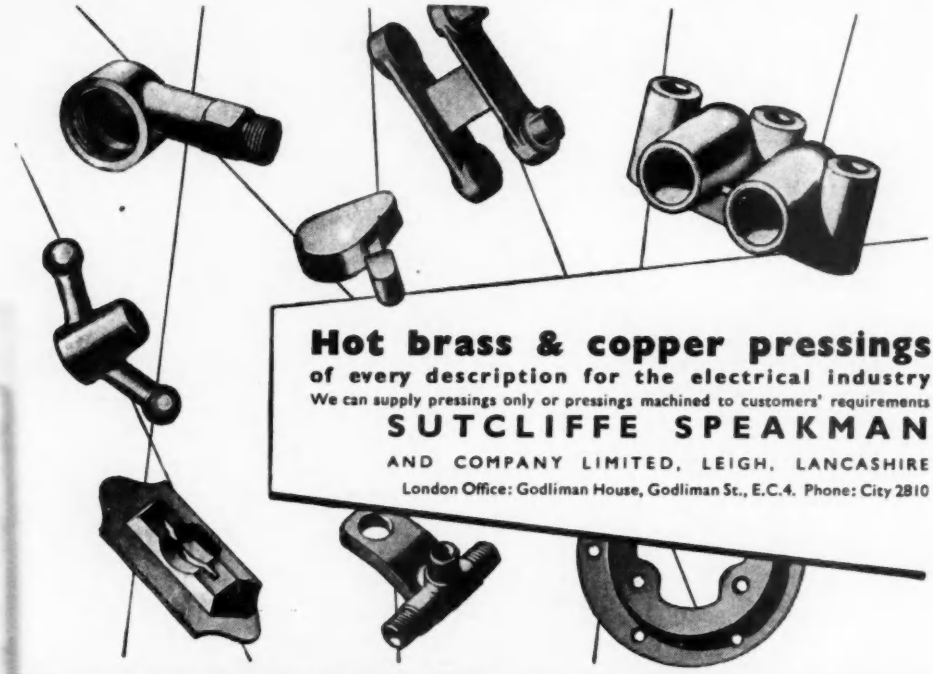

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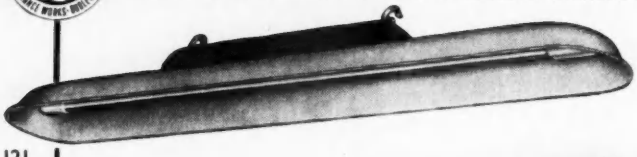

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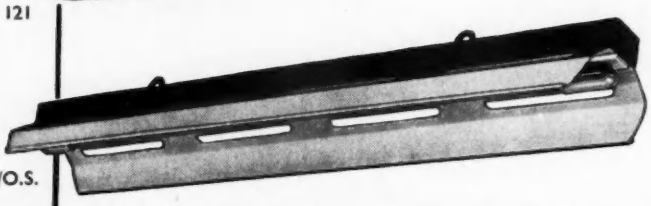

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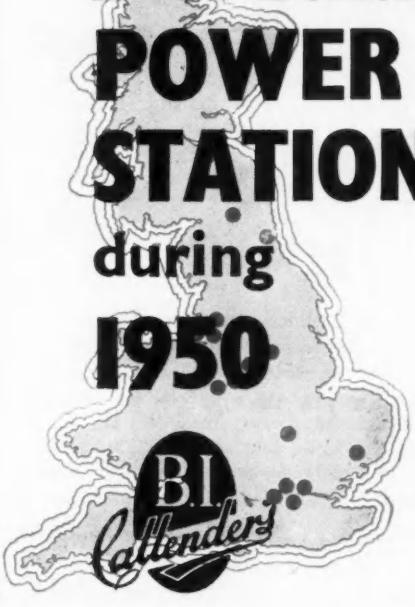

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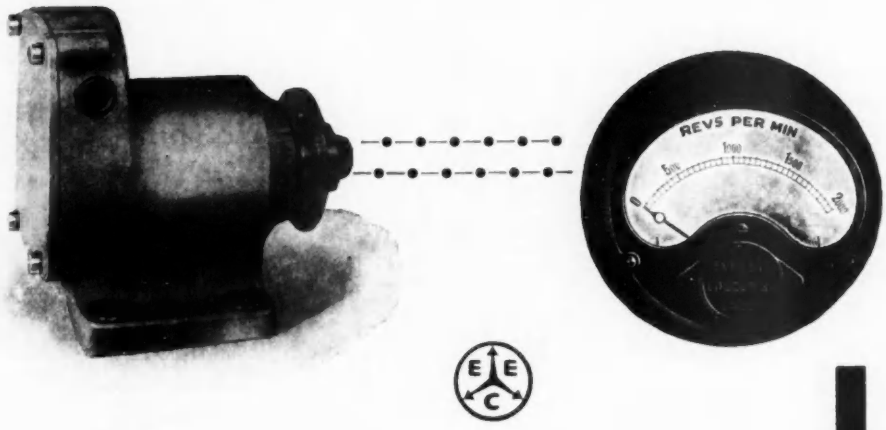

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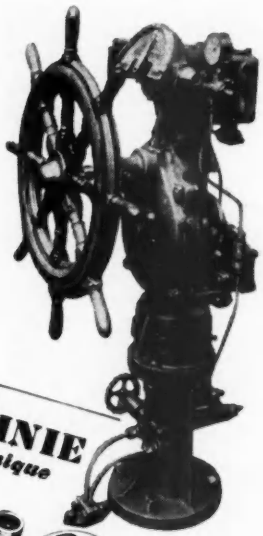

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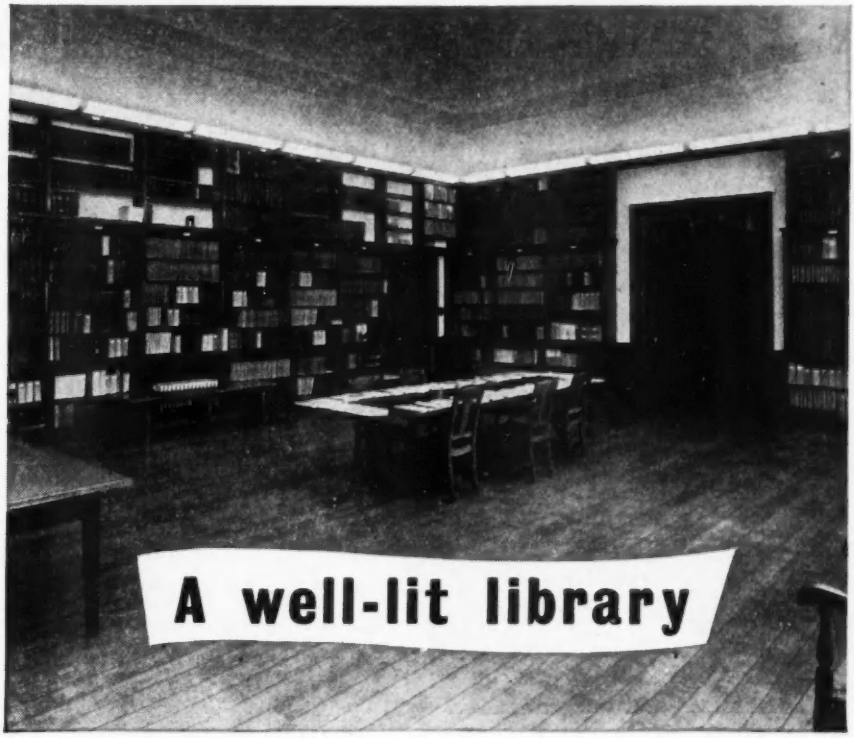

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ELECTRICAL TIMES

Vol. 119 No. 3104 THURSDAY 3 MAY, 1951

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SIXTIETH YEAR OF PUBLICATION

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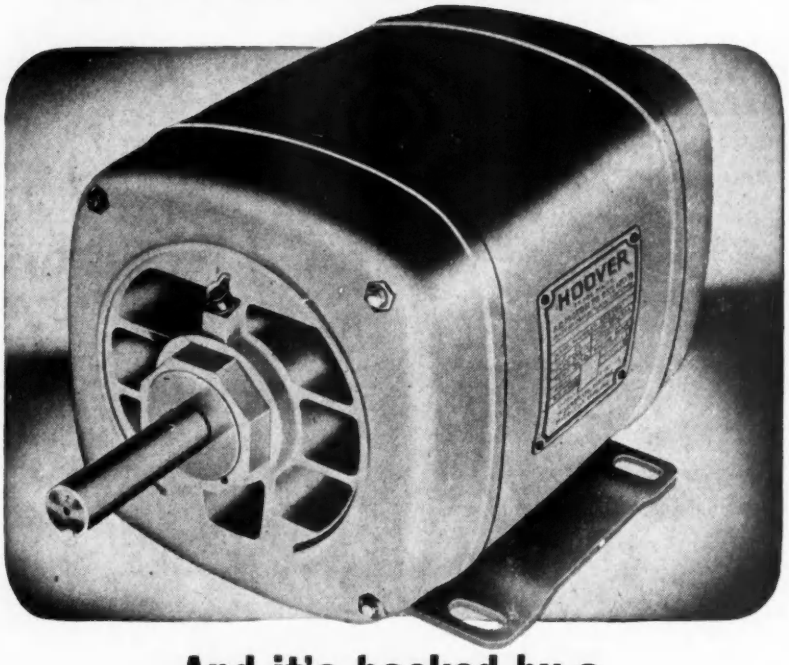

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Editorial

CENTENARY FESTIVAL

OUR King's word from the steps of St. Paul's this afternoon will be carried by radio to all parts of the world, proclaiming the centenary festival celebrations begun. This feature of the initial ceremony of the many planned for the coming months, epitomises the difference of the world today from that of 1851. To the power of steam has been added the power of electricity. One hundred years ago, electricity was little more than a laboratory experiment with limitless possibilities: now it is on atomic energy that as engineers we base our bolder estimates for the future. The world is a smaller place effectively than it was on that May day when Queen Victoria declared open that spectacular exhibition building of glass and iron; so it is fitting that the modern counterpart of steel and concrete on the South Bank of London River should be but one of many features in a country-wide organisation. It should prove a worthy centre piece for a wide-flung display of our national heritage, for it puts the whole effort of scientist, engineer, artist and administrator in their relationship one to another, and it is there that the general interest of visitors lies. 1851 was a success that proved many critics wrong; now that the opening of this new venture is with us, a proverbial repetition of history is our outstanding wish for Mr. Gerald Barry and his many helpers.

ONE EYE ON BUSINESS

WITH the completion of the South Bank site, it is good to see that the business promotion aspects of the exhibition have not been neglected. From the beginning of planning it was emphasised that this was to be no trade fair; space could not be bought. Still, a highly selective display of much that is best in current British production has been organised, and it is in the ordinary nature of such matters that a shop window full of the best goods should arouse thoughts of business in the minds of many attending principally for pleasure. In logical pursuit of their policy of arranging every facility for visitors, the festival authorities have provided a little advertised service to meet this situation. "Trade information" bureaux are situated in appropriate pavilions, and at these inquiries arising from the adjoining displays can be handled. Backing up this service is the more widely noted "Design Review," an illustrated catalogue of British quality production generally. With these sales agencies, supported by the B.I.F. for the first few weeks of the Festival, there should be some tangible results if not in the way of orders springing directly from the Festival celebrations.

B.I.F. PROSPECTS

THE first general impression gained by the visitor to the electrical section in this year's British Industries Fair at Birmingham is that it is much smaller than in previous years. This can be partly attributed to the fact that many makers of domestic equipment such as electric cookers and washing machines have dropped out. In this, materials restrictions have doubtlessly played a part, but it is not possible to overlook the trend in this direction that commenced two years ago. How far this absence of domestic appliances is likely to become a permanent feature is a matter for conjecture, but the signs are not propitious. However, as a compensating feature, the general standard of the remaining exhibitors' displays is remarkably high. Much greater use is being made of photographs and models for illustration purposes; several firms are concentrating attention on one type of equipment only instead of packing all the available space on the stand in a heterogeneous and bewildering collection,

and generally, stand appearance has been much improved. It is, admittedly, early days to assess the trading worth of the Fair, but the feeling is that the demand for heavier plant will remain high, while that for lighter equipment will be somewhat lower than in previous years.

SAVING COAL AND SULPHUR

SULPHUR is the outstanding scarcity at present; a few weeks ago coal headed the list of industry's troubles. The fertiliser plant described elsewhere in this issue starts its process with these two commodities, amongst others, and Meteor was particularly interested to see how the double need for economy was faced. The chemical intricacies of the most efficient sulphuric acid plant in Europe, which looks after the sulphur side, are beyond an engineer's understanding. For its proper working, though, heat must be abstracted between conversion stages. What better arrangement than that the heat becoming available should be absorbed in a boiler, generate high pressure steam, and the steam do work in a turbine before being passed out to plant in which it can be used at low pressure. Such ideas of heat conservation have been increasingly preached in recent years, but the Immingham plant must be one of the most complete examples of the theory carried into practice. Admittedly the chemicals industry offers more opportunity than most for such exercises in practical thermal economy, but the lessons learned there are well worth the attention of power engineers with other problems.

LONG LIFE LUMENS

QUESTIONS raised in this column last December regarding the value of increasing the life of fluorescent lamps have now been answered. We are now assured that the improvement need not be confined to cathode life alone, but that the average efficiency can be maintained throughout a longer life. It still seems, nevertheless, that there are two totally different aspects from which the whole matter may be reviewed. Large-scale users of fluorescent lighting in the commercial and industrial fields are keenly interested in both questions, since the increased physical life would be of little interest if there were a rapid decay in efficiency—unless, of course, they belonged to the school which recks so little of lumen output that it does not even bother to clean its reflectors. The chief attraction of fluorescent lighting for the discerning consumer, in addition to its other qualities, has been its reduced consumption. Now that it is possible to obtain a life of 5,000 hours relamping charges fall into line as well.

DOMESTIC CONSIDERATIONS

AS it stands at the moment, however, the development will mean little to the average householder. How much he cares for lumen maintenance can be realised from the number of blackened bulbs which can be seen in the average household. Nor is he really affected overmuch by increased life. With less than a thousand burning hours a year, even the shorter-life tubes would seem almost everlasting. Fluorescent lighting is at present considered a luxury item in the home. Its sales depend on its æsthetic appeal, and widespread use will only arrive as a result of reduced first cost. The tungsten-ballasted lamp was a notable step in this direction, but the development of longer-life lamps opens up another angle—that of simplifying the control gear used with a standard fluorescent lamp. Accelerated life tests carried out in 1946 with a simple "bump" starter showed that the life of lamps then available was reduced to less than one-fortieth of that obtained with conventional starter circuits owing to the gradual disintegration of cathode material caused by lack of pre-heating. It would be interesting to know what the comparable figures are for the tougher cathodes available today. If a reasonable life can be obtained with a greatly simplified starting circuit, it will do more to sell fluorescent lighting to the householder than will any claims regarding the maintenance of lumen output.

Meteor

An Engineer at the FESTIVAL

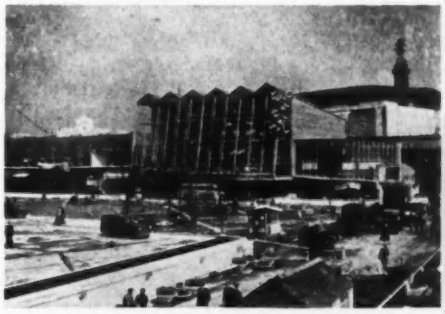
ALL BRANCHES OF TECHNOLOGY WELL REPRESENTED AT THE SOUTH BANK

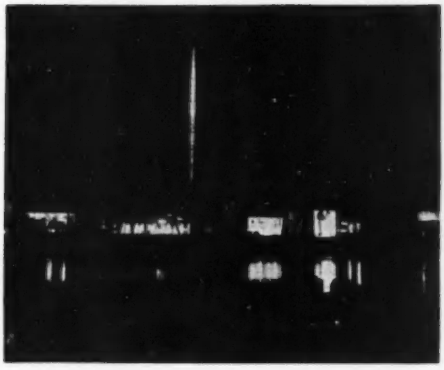
FOR most Londoners, and for many overseas visitors to Britain this summer, "The Festival" will mean first and foremost, the South Bank Exhibition. This remarkable compression of buildings of many architectural styles between County Hall and Waterloo Bridge is avowedly the centrepiece of the Festival. So it is this feature of a country-wide organisation that we describe in the following pages, though it must not be forgotten that Glasgow (the Exhibition of Industrial Power, Kelvin Hall, May 28 to August 18) and South Kensington (Science Museum, May 4 to September 30) have shows of more concentrated interest to the technologist.

The South Bank Exhibition is to be opened by H.M. the King tomorrow, and will remain open thereafter from 10.30 a.m. to 11.30 p.m. (Sundays 12.30 to 11 p.m.) until September 30. Except on Tuesdays, admission is by advance ticket only, price 5s., up to 3 p.m., and at the turnstiles thereafter, charge 4s. On Tuesdays, and on the opening day, advance tickets are priced at 10s.

It is of interest to note that the South Bank Exhibition is only a short bus ride from our offices, and should any overseas readers of the ELECTRICAL TIMES care to call upon us when they are in London for the Festival, we shall be most pleased to make their acquaintance.

One suggestion to intending visitors to the South Bank. There are so many things to see, and so many buildings and decorative features crowded into a relatively small area, that it is well worth while purchasing some such booklet as the official guide (Stationery Office, price 2s. 6d.), and planning the visit beforehand. Unlike many exhibitions, this one makes an attempt to tell a connected story, and it is advisable to follow the planned sequence of pavilions.





Illustrations on the right show some South Bank scenes during the final days of preparation. At the top is the Transport and Communications pavilion, while the interior of the Power and Production pavilion is seen in the bottom picture. In the centre, the Skylon dominates the Festival illuminations seen from the north bank of the Thames

No doubt every visitor to the South Bank site will have his own idea of "musts" amongst the exhibits. All we shall attempt in this article is some indication of where the electrical engineer can find displays of particular interest in the various pavilions; and, for the engineer, four pavilions stand out: Power and Production, Transport and Communications, the Telecinema, and the most strikingly successful of all the South Bank architectural experiments, the Dome of Discovery.

Power and Production

"Power and Production" is an exhibition in its own right, housed in a welded tubular-steel framed building on the western fringe of the Festival site. Modern machinery is at work in the main hall, which is nearly 100 yards long. Older, but still important methods, are exemplified in a "craftsmanship in industry" section and, finally, since industry manufactures for sale, there is logically a "showroom," where typical examples of current British machine production and manual craftsmanship are displayed.

Proper appreciation of electricity's part in industry is given at the very entrance to the pavilion. A full-scale mock-up of a 60 MW turbo-alternator ties in with a further model of the national Grid control room, and a B.T.H. 275 kV "shuntarc" circuit-breaker. All three exhibits are imposing in size, and will readily attract the attention of visitors. Below them a range of relays and switchgear by various makers emphasise the many problems to be overcome in power generation and distribution, and miniature scenes and models consolidate in the visitor's mind the relation of these components one to another.

History of Light

Perhaps adequate illumination has been the greatest, as well as the earliest, result of electrical power engineering for most people. The story is here traced from the candle and the earliest Swan filament lamp, down to modern discharge lighting. Throughout, accent is placed on successive improvements in the control of light intensity and direction, and a selection of modern fittings demonstrates the art of the illumination engineer.

For the rest of the pavilion, electric motors are unobtrusively at work in connection with the various machines carrying out die-casting, rubber vulcanising, carpet weaving, biscuit production and some other processes. In the research and testing sections, too, electrical gear is shown in its place amongst the many instruments necessary to the scientific determination of data for such varied industries as boot and shoe making, dyestuffs, metals (here the accent is on the magnesium-zirconium alloys used in gas turbine plants) and flour milling.

The power and production pavilion is a convenient spot for a break for refreshment, too, though it is to be hoped that the aptly named "whistle buffet" will not too closely remind visitors of "the modern industrial canteen" it is planned to resemble.

Transport and Communication

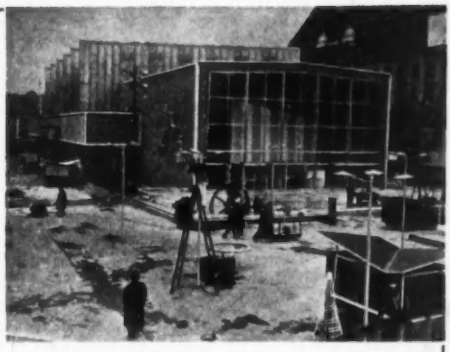
Three galleries at different heights, and a collection of railway engines and rolling stock outside, make the 250-ft long "Transport and Communication" pavilion an obvious attraction. Adjoining modern steam locomotives and record breaking aircraft suggest that it will prove a schoolboy's joy; for the more sober-minded there are the technical interests of one of the Manchester-Sheffield electric locomotives (Metropolitan Vickers) and a 660 h.p. diesel-electric loco (English Electric). In this rail transport section there is also on show electric signalling apparatus, ranging from telegraph equipment to four aspect colour light signals and point operating machines.

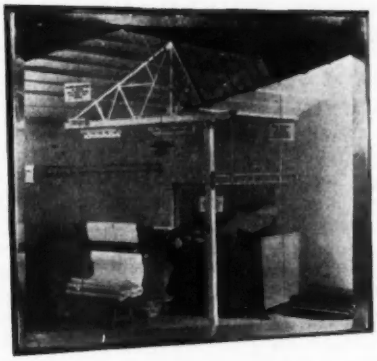
From rail to road, with electrical engineering represented by a small section on trams, a selection of battery vehicles, and by the many incidentals to safety in the streets that can be classed as "street furniture." The trams range, in model form, from the earliest London type to the most recent examples from up-to-the minute Blackpool. In the "furniture" display it is the various types of electric street lantern that particularly attract attention, for their demonstration of how effectively the conflicting requirements of efficient working, mass production, and aesthetic satisfaction can be met.

Throughout the story of transport the technique of conveying information is represented. So vast is the subject, however, that it has correctly been decided to give over a separate section to the story of British contributions to the development of communications. Part of the ground floor and three 100 ft by 28 ft balconies tell the tale, beginning at the bottom with the letter post and telegraphy, and proceeding upwards with telephones, cables and radio communication, television, and sound broadcasting, and recording.

In each section the approach is partly historical, partly functional. Many working models are included, such as that which shows the directional properties of a short-wave beam aerial by direct measurement and display on a c.r.o. Another notable feature is a 4 ft high

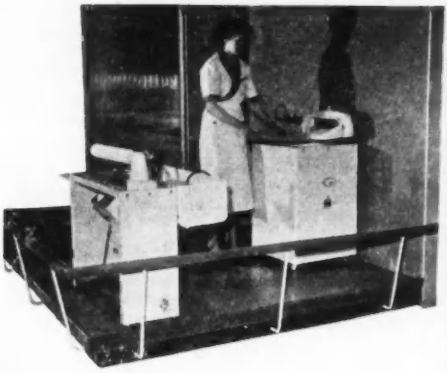
The Power and Production Pavilion on the right finishes with the well lit "Showroom" shown in our illustration



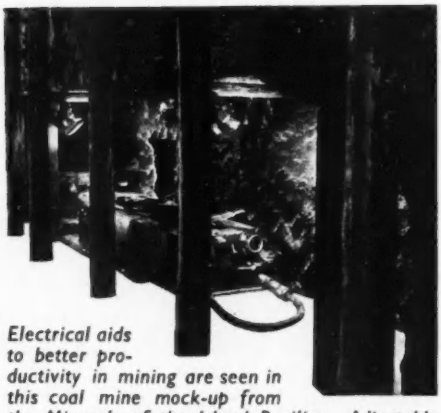


Many models similar to that on the left illustrate the progress of illumination engineering

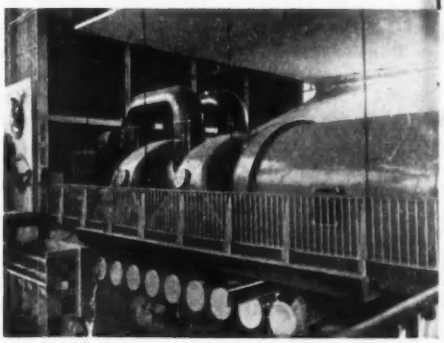
In the Homes and Gardens Pavilion this electric ironer and washboiler are part of the equipment in a utility room. Many other electrical domestic appliances are displayed

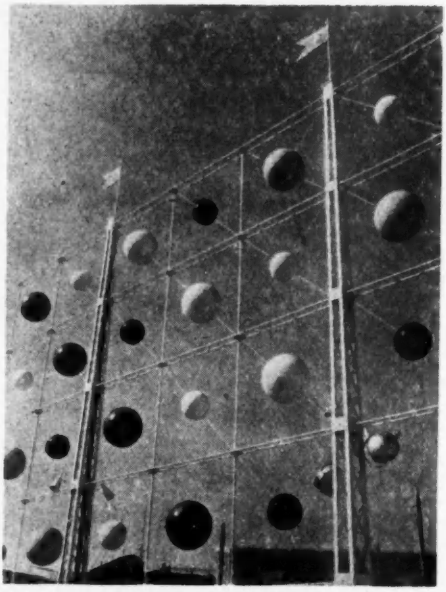


Outstanding in the Power and Production Pavilion is a mock-up of a 60 MW Metropolitan-Vickers turbo-alternator



Electrical aids to better productivity in mining are seen in this coal mine mock-up from the Minerals of the Island Pavilion. Adjustable lighting and a coal-cutter are prominent





Floodlit at night with varying intensity, this novel screen marks one boundary of the Festival exhibition

model of a magnetron, with illuminated "tracks" showing the paths of electrons and of h.f. currents. In the television section there is additional advertisement for the lamp manufacturer—various demonstrations of T.V. camera work are staged, and these are served by high-intensity, compact source discharge lamps.

Telecinema

Entertainment, together with an opportunity for taking the weight off one's feet, is provided in the Telecinema. Here, large screen cinetelevision is demonstrated, and stereoscopic films are projected with additional realism provided by the use of stereophonic sound.

B.T.H. projection equipment is used for the film demonstrations with B.T.H./H.M.V. stereosound recorders and reproducers. All the equipment used is housed in a special glass-walled projection room, so that the operating technique can be viewed by visitors.

For the purpose of stereoscopic viewing, two images maintained in horizontal and vertical register are projected on to the screen by running two separate film projectors in synchronism with one another, the light beam from each being polarised in a suitable manner by filters carried on the projectors. The resulting images on the screen, when viewed through the polarising spectacles which must be worn by the audience, give a three-dimensional effect which is particularly remarkable in relatively close shots.

Stereophonic sound employs two or three different speaker systems in the auditorium, with magnetic recording of the sound to be projected, separate from the visual film. As a final help to realistic pictures, the background and surround for the scene on the screen is projected so that it is darker than the high-lights of the picture, but less dark than the blackest sections.

Dome of Discovery

Science is behind almost all engineering progress, and the home of science in the South Bank exhibition is the Dome of Discovery. Perhaps this magnificent 365 ft diameter, 95 ft high aluminium sheathed building may be taken as an archtype of the assistance the engineer renders to the scientist.

For the electrical engineer the most obviously interesting display within the dome is that showing the pursuit of ever more detailed knowledge about the structure of matter, culminating in a topical section on nuclear energy. Modern exhibition and display technique is applied to its full effect here, and the surroundings add to the effectiveness.

The nuclear physics display is mounted on a platform raised above the ground floor, and divided into five sections—rare gases, science in fine arts, new physical research, nuclear physics, and applications. Centrepiece of the display is

In the Transport pavilion is this Crompton Parkinson two-motor tramcar bogey with resilient wheels and Vambac control equipment

a large sectioned model of an atomic pile, from which the essentials of pile energy control methods can be seen.

Another section of the Dome story which is of electrical interest is that dealing with the land. The story of water control is worked out here, and British achievements in dam building, irrigation and hydro-electric power generation are shown by models and small size equipment, with a fuel scale water turbine runner as the centre of this presentation.

Elsewhere

It is not only in such "obvious" pavilions as those described above that the visiting engineer will find subjects to interest him professionally. Many special tools, machines and lighting techniques for mining are presented in the "Natural Resources" building, a pyramid-shaped structure that gives on to the "Power and Production" section. In the extensive "Homes and Gardens" pavilion there is widespread evidence of what the availability of an electricity supply can do to make living more pleasant—and safer.

Electrical domestic appliances for performing a wide range of duties are to be seen and with them, of course, a representative selection of lighting units and electric heaters. The safety side concerns methods of controlling these, and of ensuring that when a fire is knocked over, or a child's finger stuck into a revolving fan, no personal injury will result. British engineering ingenuity is equal to these problems, and to many others for which a solution is found in this part of the Exhibition. Both men and women visitors should find plenty to interest them here.

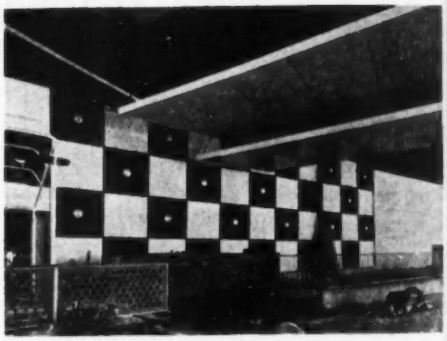
Services

Naturally, much engineering planning is necessary to keep the exhibition running smoothly once it is under way. Lighting arrangements provide the most obvious example, and full use is made of the latest techniques to secure exciting effects. Many of the pavilions are floodlit, and with them flagstaffs and decorative screens. In the latter class comes the spherical decoration at one end of the site, which will have continuously changing illumination. G.E.C. are responsible for this scheme, and for some of the illuminated bollards marking the junction of paths. Designs for ponds and fountains involve some 1,000 underwater floodlights. Fluorescent floodlighting (Atlas) has been used for some buildings, automatic dimmer control gear governing its operation.

Mazda floodlighting is widely applied in the south-east section of the exhibition site. Graded floodlighting from mercury vapour lamps adds to the effectiveness of the oddly-shaped "Natural Resources" pavilion, with a rapid change of colour to sodium vapour lamps, which play on smoke emitted from the top of this pyramid-shaped building. Mazda lamps—tungsten this time—are also used in the much photographed Skylon. All in all, there are some 80 different time-controlled lighting-circuits involving Venner time switches, and these are located in a special lighting control room, which is available for inspection by interested visitors.

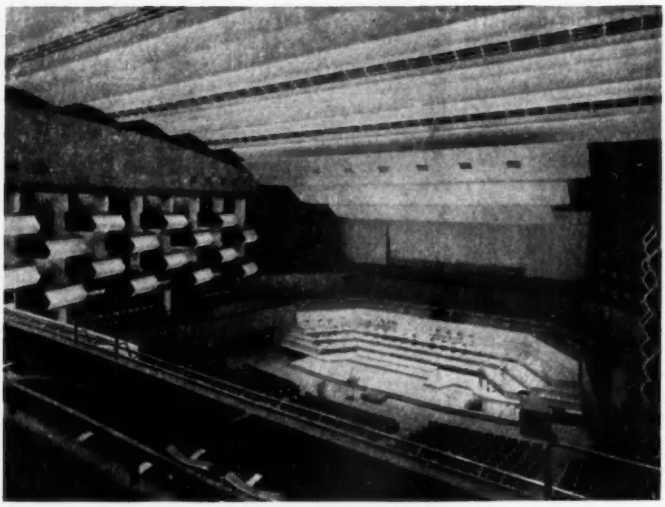
Crowd Control

Next to lighting the most widespread "electrical" service is probably the public address system. Central Radiffusion Services, Ltd., is the firm involved, and they have provided a network feeding some 700 speakers. With other light-current services (fire alarms, crowd-counting, light signals and clocks) the cables for the P.A. system are run in 4 in. diameter asbestos tube ducts. In general, the speakers are used both for announcements and for the broadcasting of music. Exceptions occur in the open spaces—"concourses" the authorities call them—where it has been difficult to secure suitable mountings. Here, 75 in. metal horns with pressure units are grouped at one point source, well above ground level, and are used for announcements only.



Typical of decoration and lighting at the Festival site is this installation of tungstens and fluorescents by G.E.C. under Hungerford Railway Bridge

Finally, the odd jobs—salvage collection, milk delivery, general transport. Here Brush "pony" electric road vehicles will be prominent. Kitchens, too, are in many cases fully electrically fitted, examples being those equipped by Crypto (one of the L.D.C. group) for the Riverside and Regatta restaurants and for the Harbour and "51" bars.



The Royal Festival Hall

In the one permanent feature of the South Bank site, the concert hall which Their Majesties the King and Queen will visit this evening, the full range of engineering skills has been applied to the service of musical art. Acoustical techniques as applied in the concert hall proper have been the most widely publicised feature, but the lighting schemes are likely to run it close eventually.

Primary lighting in the hall was conceived by the architect as a general part of his building. In the auditorium, for instance, both stage and general lighting are treated in this manner, the former being largely housed in the acoustic canopy and the latter in the special coves and recesses comprising the architecture of the ceiling. Here, Osram warm white cold cathode tubes are concealed in nine sets, each containing three lines of tubes, and they are supplemented by a large number of Osram 150 W tungsten filament lamps. All the cold cathode tubes are arranged for a high ratio of dimming, and the control apparatus for this operation is housed at roof level.

Lighting

Lighting for the concert platform area and for dramatic productions has been provided by the Strand Electric and Engineering Co., Ltd. This special lighting, like some of the general lighting, has to be projected through the acoustic soundboard which hangs over nearly all the concert platform and choir. Thirty-three 1 kW 26° floods are allocated for this purpose, and in addition there is provision for the more comprehensive illumination required if plays are attempted. Control is from a Strand light console desk, situated in a small room at stalls level. From this 42 in. by 18 in. by 43 in. high desk, one man can control the 84 stage lighting dimmers and switches and the 55 four-colour mechanisms; 15 V d.c. from a rectifier is used to control motor-driven dimmers.

Hall Wiring

A 1·5 MVA 11 kV/415 V substation supplies the concert hall (see ELECTRICAL TIMES, November 30, 1950), the medium voltage supply being taken through ten service cables to two main switchrooms. Distributing cables from these points are taken along low-level ducts and service corridors, and vertically by rising power ducts at each corner of the building.

For heavy power circuits and for all submains, p.i.l.c.s.w.a. cable has been used. Other sub-circuits, except in the boiler house, are run in v.r.i. cable carried in screwed conduit. Henley's cables have been widely applied for these purposes. In connection with the boiler house, Pyrotenax cables have been used for sub-circuit wiring, thermostatic control and for indicating plant.

Included in the general sound equipment of the hall are microphones specially designed to serve the needs of the B.B.C. during their sound and television broadcasts. These microphones are wired to a special control panel in the sound control room to allow their allocation to the B.B.C. in accordance with the type of production being covered.

Our readers' views ...

Uncertificated Engineers

DURING the last few months we have read several letters in the Technical Press about the merits of the "Certificated" and "Uncertificated" Engineer, and I think we are getting away from the true facts of the case.

Since vesting day we have seen vacancies advertised both on departmental notice-boards and in the press, for every position in the industry from Junior Engineer to Divisional Controller, and most of them are worded "Must be a Corporate Member of the I.E.E. or hold equivalent qualifications." But to be a Corporate Member of the I.E.E. one must have passed the I.E.E. examination, or possess exempting qualifications such as the Higher National Certificate, or tender a thesis (by permission of the I.E.E. Council).

The I.E.E. examination or Higher National Certificate is undoubtedly the ideal, but the thesis method is definitely easier. The snag is that the thesis entry is only open to Engineers in a very limited grade, i.e. (pre-vesting day) Borough Electrical Engineer and Manager, Deputy Engineer and Manager, Station Superintendent, regardless as to how the Engineer concerned attained that position. Now what about the "uncertificated" Engineer who is over 40 and is in a responsible technical position such as charge-engineer, boiler house engineer, control engineer, asst. mains engineer, or operation and maintenance engineer? These men have mostly served apprenticeships, had training at evening classes, or by correspondence courses. By hard practical work and loyalty to the undertaking, they have attained positions of responsibility and trust, and without question are keeping their end up with honour and efficiency, but they could not successfully pass a set examination of any Institution. Nor indeed could a thesis man, otherwise he would not have obtained membership of the Institution by that means.

For engineers under 25 years of age, the Higher National Certificate can be obtained by evening or day courses, adequate provision is now made by Divisions and Area Boards. But the industry is supposed to be short of technical men of good training, now. The I.E.E. could at least open the class of Associate to technical staff who are over 40 years of age and have attained a responsible position with, say, 25 years in the industry, even instituting an oral examination if necessary. This move would never be regretted by the I.E.E. or B.E.A., and would provide a wealth of loyal, conscientious talent for promotion, and successful operation in higher positions, without the lowering of technical standards. Furthermore it would give the recipient something to show for hard work and loyalty to the industry.

Another necessary item is to amend the I.E.E. regulations so that the E.P.E.A. Correspondence Scheme is recognised as a means of training for the I.E.E. examinations. The style and method of the scheme is excellent, and provides a good medium of study for shift staffs.

"Uncertificated Engineer"
(27 years' service construction and supply)
LONDON AREA

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Moot Points in Protection

YOUR report of the I.E.E. discussion last week contained some interesting comments by Mr. F. J. Lane who pointed out that if negative phase sequence protection is necessary it should clear the machine and not merely sound an alarm. Admittedly it is a serious matter to lose one's generators on unbalanced loading which *might* be cleared by tripping feeders, but is it fair to the operator to sling the problem at him knowing that he has a bare 90 seconds or so to clear the unbalance before serious damage is done? When faults occur, they usually do not do so singly, and to have yet another set of alarms to deal with, in addition to disturbances on the network, is asking too much of the average operator.

In most cases, he would play for safety and trip out the generator just as the protective gear would do. Temporary shut-downs are serious matters but there are few operators who would risk having to "carry the can back" for long outages due to overheated rotors.

"j"
LONDON

"MACHINAE SPECULATRICES"

Robot Tortoises Applied to Study of Cybernetics

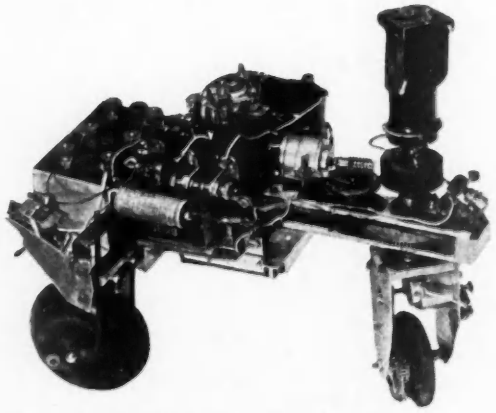
ROBOT tortoises that almost think are an interesting by-product of the work carried on in cybernetics by Dr. W. Grey Walter, of the Burden Neurological Institute at Bristol. Cybernetics, or the mathematical study of control and communication in animals and machines, a science that has sprung into prominence in the last few years, is not only used in investigation of the nature and functions of the brain, but in the design of electronic computing machines, guided missiles and other self-regulating mechanisms.

The tortoises, whose mechanism closely reproduces certain elementary functions of the human brain, react to stimuli of light and touch. When attracted by a light in a darkened room, they advance methodically towards it, butting their way past any obstacles strewn in their paths. As soon as they are near enough to be "dazzled" by the light, however, the tortoises are repelled and then wander off in search of some other attraction. If two of them are running about simultaneously they may eventually pick up each other's small headlight and, coming together, cavort around in a "mating dance." When one of the tortoises "recognises" itself in a mirror, it displays symptoms of bewilderment and indecision, and when confronted with several alternative sources of light to choose from, it proceeds to investigate each in turn.

Perhaps the most astonishing feature of the animal's behaviour, however, occurs when its battery begins to run down. As soon as this happens the tortoise heads for home—attracted by a light in a plastic hutch housing a trickle-charging apparatus—and, without assistance, plugs itself into the battery-charger.

Construction and Operation

The mechanism is contained in a roughly hemispherical plastic shell mounted on a tricycle chassis with pneumatic-tyred wheels, the front wheel assembly supporting the periscope-like photo-electric cell, the driving motor and its associated gearing. A separate "scanning" motor, suitably geared, rotates the whole driving-scanning unit on a vertical axis through 360°. Power for these motors is supplied by a 6 V Exide accumulator mounted above and



Construction of the robot tortoise, which is shown at the top of the page emerging from its "hutch." The front wheel drive and swivelling mechanism are clearly seen

Dr. Walter calling his pet from its hutch with a flash lamp

behind the rear axle. The h.t. supply for the electronic control circuits is provided by an underslung 45 V Drymax battery.

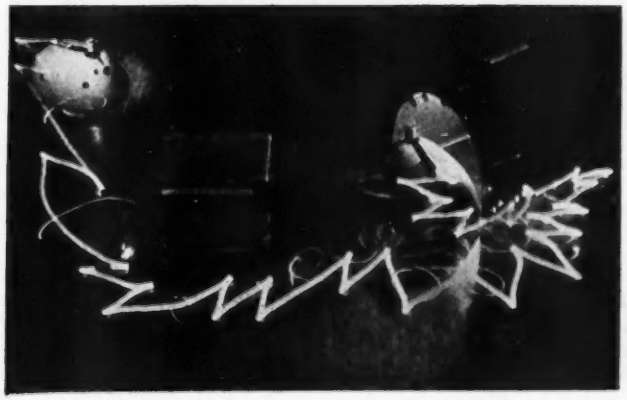
The control system consists simply of the photo-electric cell and two pentode valves with a relay in the anode circuit of each. When the mechanism is switched on, the bias on the grid of the first amplifier valve is well positive and an appreciable anode current flows, closing the relay in the anode circuit. However, the anode load—the resistance of the relay coil — is such that the anode voltage is at a minimum and consequently the potential of the screen of the second valve, to which the anode of the first is connected, is also at a very low level. The anode current of the second valve is, therefore, small and its associated relay remains open. With the relays in this position, the headlight comes on, the driving motor works at half speed and the scanning motor at full speed. The front wheel of the tortoise is slowly rotated through 360° at the same time as it is driven forward; the whole model accordingly explores its environment in a series of cycloidal swoops.

If, while scanning is going on, the photo-electric cell picks up a light of moderate intensity, the bias on the grid of the first valve is reduced, thereby reducing its anode current. Although not sufficient to open its relay, this reduction in current raises the potential of the screen of the second valve, applies a transient signal to the grid, and raises its anode current thus closing the second relay. In this position the scanning motor and the headlight are switched off and the driving motor turned full on. The photo-electric cell, left facing in the direction of drive is, of course, pointing at the light source, and the animal moves towards it.

The trailing action of the rear wheels, however, tends to revolve the whole body of the animal so that the photo-electric cell is soon no longer directed at the light. The relays then return to their first position and scanning begins again until the light is picked up once more. The whole sequence is then repeated until the animal draws near to its objective.

As soon as the intensity of the light reaches a certain strength, the bias on the grid of the first valve, and, therefore, its anode current, is materially reduced, thus opening its associated relay. The current through the second valve, of course, increases, but as its relay is already closed no alteration takes place. Operation of the relay in the first valve turns the scanning motor half on, so that the tortoise swerves away from a bright light—unless it is "hungry," when it retains an interest, particularly in the bright light within its hutch.

Upon collision with an obstacle, the animal's shell is



A remarkable picture of the track taken by the robot tortoise to return to its hutch after working round an obstacle.

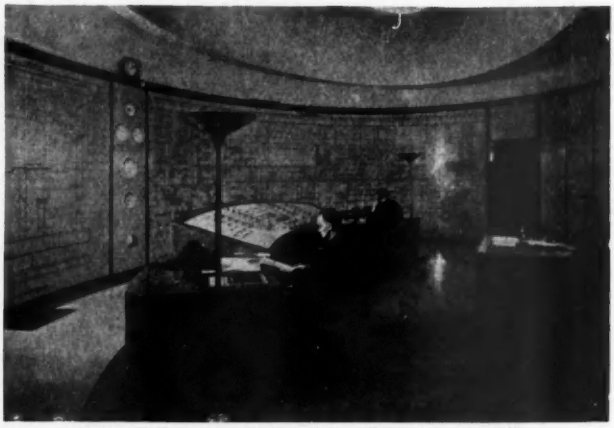
tilted slightly, closing a stick and ring switch that completes a multi-vibrator circuit that feeds the output of the second valve back to the grid of the first via a condenser. The relays operate in turn and the animal butts its way clear.

Dr. Walter's strange pets have already provided him and his research team with a number of valuable clues in their work on the brain, and recent developments in his *Machinae Speculatrices* show that their usefulness is far from exhausted. They were recently shown in Paris at the Congress of Cybernetics and they are also on view in the special exhibition at the Science Museum during the Festival. A more advanced tortoise has been constructed which can answer to whistles.

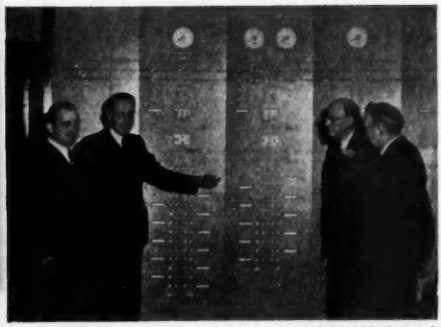
We are indebted to Chloride Batteries, Ltd., for the information contained in this article.

REMOTE CONTROL AT MANCHESTER

NEW remote control gear was inaugurated last week in what is believed to be the most highly concentrated industrial area in the world. Number One Sub-Area of the N. Western Board's territory includes over 50,000 industrial consumers in and around Manchester, and has the highest known density in kW per sq mile. Remote supervisory control was installed some ten years ago by Manchester Corporation for control of the 6·6 and 11 kV substation networks, and the installation, manufactured by Standard Telephones and Cables, Ltd., provided for an initial capacity of 79 unattended substations, which has now risen to 130, the ultimate capacity being 600.



(Above) The original installation for 6·6 and 11 kV



At the handing-over of the new 33 kV board. (L. to r.) Mr. C. G. White, Standard Telephones; Mr. H. G. Bell, No. 1 Sub-Area Manager; Mr. R. A. S. Thwaites, Deputy Chairman, North Western Electricity Board, Mr. O. Howarth (Chief Engineer)

The operation has been so successful that it was decided some time ago to extend the principles to include the 33 kV network, and the new board, installed in the Dickinson Street control room, was officially handed over last week.

Part of the relay apparatus for the new 33 kV board

Notes on Wiring
by MEGOHM

Shortages Again

Critical Position in Supply of Steel Goods

I SPENT a pleasant evening with the Supervisors a few weeks ago at their annual dinner. In the course of conversation, general complaints were made that supplies of essential materials for use on installation work are now getting difficult to obtain and deliveries of six to twelve months are once again being quoted by manufacturers. For certain materials they are refusing to accept orders for deliveries this year, and one well-known cable manufacturer has circulated a memorandum to his customers stipulating before accepting an order, even for delivery next year, he wants to be advised the type of installation for which the cable is required.

Whilst not doubting for one moment the necessity of the manufacturer's enquiry in these days of scarcity, the contractor now has one more form to complete and return and is wondering what will be the next.

I am told the steel position also is very acute and angle irons and flats used in the construction of switchboard frames and cable hangers, etc., are now unobtainable from steel stockists and rolling mills. The steel stockists say they have no stocks and in fact are unable to meet orders they accepted many months ago.

Rolling mills also have a full order book and orders have been reluctantly sent back to their customers, with the suggestion that stockists should be approached.

So difficult has the situation of supplies become, I am told that 1½-in. dia. large bolts are being purchased in the Midlands and sent to the mills to be rolled down into rods.

I have made enquiries in connection with the steel situation, and my information is that when controls were removed on iron and steel early in 1950, orders from the home market to the mills virtually ceased. In March, 1950, the position became so acute that the British Iron and Steel Federation advised the Government that unless they were allowed to export, some mills would have to shut down.

In June, 1950, sanction was given to export iron and steel and, in view of the fact that British iron and steel is the cheapest in the world, no difficulty was experienced in obtaining orders in the export market at considerably higher rates than those obtainable in the home market. For example, in the hard currency areas over double the home market rates were easily obtained and substantial contracts at these rates were accepted.

On the Korean outbreak, orders for iron and steel from the home market poured in, and at the same time shipping employed for bringing iron ore from North Africa was taken off this run and diverted to other uses, including the bringing of coal from the United States to Europe. Supplies of scrap metal from the battlefields and Germany also ceased and in consequence our difficulties became worse. Since this time the raw materials situation has progressively got worse, and our several nationalised industries and Ministries are now competing with each other for supplies of iron and steel; it is everyone for himself today.

I understand the position to be that if contractors' normal stockists cannot meet their requirements, then there is nothing they can do, whether the iron and steel is required for building important research establishments, generating plant and the like or for not so essential works, such as cinemas or luxury stores, as no priority system is in operation.

Stock-piling of steel, I am told, is not being carried out to any large extent, although it may be possible that this is being done in a small way in isolated cases. In general, mills and stockists have been asked to curtail where possible their export commitments, and I understand this co-operation is being given.

I hope the above information will be of some assistance to contractors and may help to focus the authorities' attention on the difficulties of carrying out installation work today. From the contractors' point of view much hard work and expense is being incurred in seeking and chasing materials which are not available, and it would be interesting to have some information on, say, the cost of letters and orders written and returned, telephone calls and telegrams sent, filling in forms, and engineers' time attending meetings to answer questions on progressing of materials.

BRICKS *of the Universe*

Sir John Cockcroft discusses the ultimate structure of matter

GIVING the 42nd Kelvin Lecture before a crowded audience at the I.E.E., Sir John Cockcroft said that the nuclear model of the atom was first established on a firm basis when Rutherford described it as a positively charged central nucleus surrounded by electrons equal in number to the units of positive charge in the nucleus. In 1919 came Rutherford's classical experiment on the transmutation of nitrogen by high-speed alpha particles, and work carried out between 1932 and 1939 had made evident the wide variety of transmutations which could be produced, protons and neutrons being among the particles ejected.

The discovery of the neutron greatly simplified the picture of the structure of the atomic nucleus, which was now thought to be made up of a number of protons equal to the nuclear charge, the remaining part of the mass being accounted for by neutrons.

A search for periodicity in the properties of nuclei of the same general nature suggested that special properties appeared when the number of neutrons or the number of protons had the values of 20, 50, 82 or 126, which were known as the magic numbers. This led to the general assumption that the "magic number" nuclei were of exceptional stability.

Nuclear Forces

Extremely powerful forces were known to exist within the nuclei. Clearly there must be very strong electrostatic forces of repulsion, tending to blow up the nucleus. There must therefore be some balancing force of attraction. Otherwise, nuclei could not stay together. This force could not be electrical, magnetic or gravitational in type. It was known as the "nuclear force", and it must be regarded as the basic cement of the universe. It was the central problem of physics to-day.

The first suggestion as to the nature of nuclear forces came from the Japanese physicist, Ukawa, who put forward the idea in 1935 that they might be thought of in terms of the particles—neutrons and protons—emitting and absorbing a new kind of photon of about 150 times the mass of the electron, capable of carrying an electrical charge. At first, this was regarded as pure speculation but between 1936 and 1939 particles which were more penetrating than electrons were found in cosmic rays. They were given the name of mesons, their mass being intermediate between the electron and the proton.

Types of Meson

Since then, Professor Powell of Bristol University, using a new and very sensitive photographic emulsion, had found two kinds of mesons—π mesons with a mass about 271 times the mass of the electron which could change into μ mesons with a mass of 217 times the mass of electrons. When the change took place other particles were created which were believed to be photons or neutrinos. Some mesons carried a positive and some a negative charge, while others appeared to carry no charge. The latter had the remarkable property that they could decay into two high energy gamma-rays. Mesons could also be created in the laboratory by means of the synchrotron, and it was hoped that the Glasgow synchrotron would provide mesons for experimentation.

Two years ago Dr. Butler and Dr. Rochester, working on cosmic rays at Manchester, had obtained evidence of an even heavier type of meson, since called the V meson.

As yet, theoretical physics could offer no clear answer about the light mesons threw on nuclear forces beyond saying intuitively that they must be connected with the intense nuclear fields obtaining in closed collisions. Sir John Cockcroft concluded by outlining some astrophysical theories on the creation of the universe, one of which assumed that hydrogen gas was the starting point, and another using neutrons as a basis. No doubt, he said, theoretical and experimental physicists would agree that the subject was "in a mess", but a lot of new information was now available about a lot of new particles. It was to be hoped that some day a genius would appear who would know how to put it together properly and how to explain the nature of the fundamental nuclear forces.

A vote of thanks to Sir John Cockcroft, proposed by Mr. T. G. N. Haldane, M.A., and seconded by Sir George H. Nelson, was passed unanimously with acclamation.

Heat from Processing Economically Applied

Factory Power Generation for Latest Fertiliser Plant

SELF-SUFFICIENCY in Great Britain's industries is of dual importance. The total cost of imports is reduced, and the defence position is strengthened. It was considerations of this type that led Fisons Ltd., the Ipswich fertiliser concern, to plan in 1944 a chemical plant which would make British agriculture largely independent of American supplies of triple super-phosphate. This chemical has not previously been manufactured on a large scale in this country, supplies being obtained from the U.S.A.

Last week the completed plant was opened by Mr. Hervey Rhodes, Parliamentary Secretary to the Board of Trade. It covers some 45 acres adjacent to Immingham Dock, on the Humber estuary near Grimsby, and those who saw the site in its early days testify to 6-ft high reeds evidencing the swampy nature of the ground. Tall buildings and extensive roadways and sidings now present a very different picture.

Chemically, triple superphosphate is obtained by treating crushed phosphate rock with a carefully regulated mixture of concentrated sulphuric acid and incidentally prepared dilute phosphoric acid. The result is a 30% phosphoric acid solution, which is subsequently concentrated to 39% before mixing with further ground phosphate, the desired triple superphosphate resulting. Gypsum (calcium sulphate) comes off as a by-product.

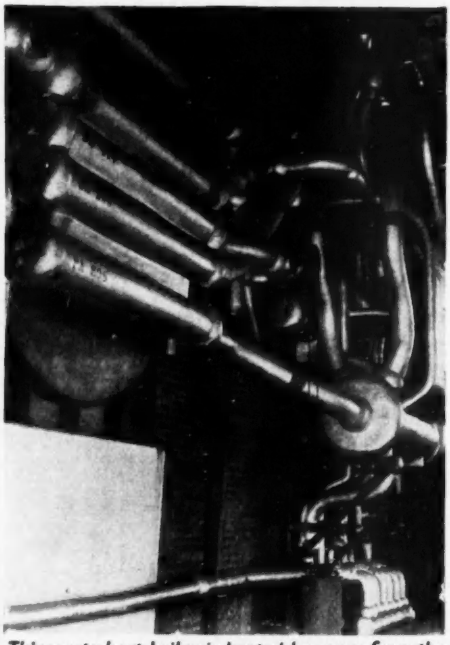
Raw materials for the process are thus essentially phosphate rock and sulphuric acid: the latter is required in large quantities, and so sulphur is imported to Immingham, and a large single stage conversion unit included in the plant. Sulphuric acid is produced in this by the contact process, using a vanadium pentoxide catalyst. From the electrical point of view the decision to manufacture sulphuric acid on site was particularly important. The process used is strongly exothermic, and the production of 250 tons of sulphuric acid/day gives enough heat to generate a steam output of 25 klb/hr at 275 lb/sq in. pressure, superheated to 700° F. When the availability of this supply is taken into account with the factory requirements for low pressure process and space heating steam, the generation of electricity on site becomes worth while. So, in the centre of the factory when we visited it recently, there was a 5,250 kW power station to highlight the interest of our tour.

Power Station

At full load, process steam requirements of the factory are 25 klb/hr, while the electrical demand runs at 3,000 kW. At this loading, the W. H. Allen Sons and Co., Ltd., steam tur-

bines require 54 klb/hr of steam, of which the balance of 29 klb/hr is condensed, and the rest passed out at between 12 and 15 lb/sq in. pressure.

Four Daniel Adamson super Lancashire boilers supply steam extra to that from the sulphuric acid plant. The boiler house containing them is 114 ft by 72 ft, and contains space for a fifth boiler. Each of the boilers is of 12·5 klb/hr capacity, with stop valve steam conditions of 260 lb/sq in., 700° F. Four bunkers of 40-ton capacity each feed the boilers which



This waste heat boiler is heated by gases from the four stage acid converter. Gases leave each pass at 750° C. and emerge from the boiler at 420° C.

have chain grate coking stokers (Hodginson). Boiler control panels by Thermo Control Ltd. are provided for each pair of units, with a single panel for checking stack conditions; 1½ h.p. d.c. motors (550/850 r.p.m.) are used on the stokers, and 14 h.p. d.c. motors (480/960 r.p.m.) on the furnace i.d. fans. These are the principal consumers of d.c. energy in the factory.

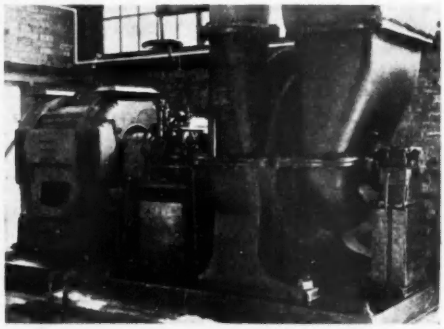
Feed water for the boilers is dealt with by two 7,500 gallons/hour Mather and Platt centrifugal pumps, one of which is electrically driven, while the other has a steam turbine as prime mover. The pumps are located in the 105 ft by 75 ft generator room; adjacent to this is a 72 ft by 23 ft water treatment section, which accommodates a 3,500 gallons/hour Permutit Co. plant incorporating a Spiractor and zeolite softening units. Finally, on the water side of the steam cycle, comes a 75 klb/hr de-aerator, located in the generator room.

Main turbines are 11 stage single cylinder machines, running at 4,500 r.p.m., and each is geared down to drive a 1,750 kW (2,190 kVA), 6·6 kV, 1,000 r.p.m. Bruce Peebles alternator with built-in air coolers. Exciters for the 194 amp full load field requirements are mounted at the end of the shafts. B.T.H. electronic voltage control equipment is installed for regulation purposes, and the control panels for each machine incorporate overload, earth leakage and Merz-Price protection. Manual synchronising is employed, and field suppression switches are provided for each machine.

Also installed in the turbine room are three 200 g.p.m. booster pumps (W. H. Allen) driven by 100 h.p. B.T.H. s.c. motors. These supply high-pressure water to wash towers.

Control Room and Distribution

For normal operation the factory load is supplied from one main bus-bar, but a sectionalising switch is provided to enable this to work in two halves. Distribution in the factory is based on standard 500 kVA B.T.H. transformers, which are mounted in varying numbers outside seven substations spread throughout the plant area. Two ring mains, each of 0·4 sq in. section feed six of the substations. The three subs supplying power house, dockside, and grinding and triple superphosphate plants are on the east ring, and a further three for power house, phosphoric acid and sulphuric



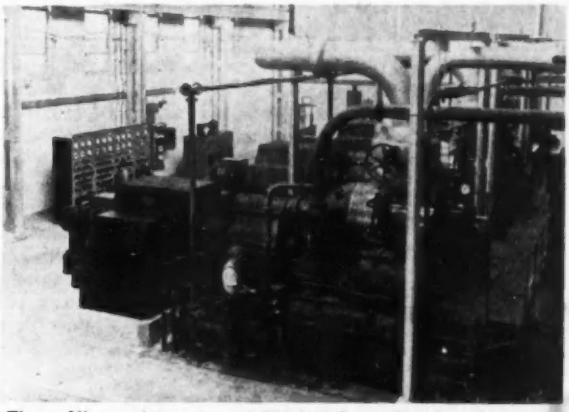
This 440 h.p. blower for the sulphuric acid plant is driven by the largest electric motor in the factory

acid, and granulating plant from the west ring.

In the control room is the l.v. board for the power house, and on this, as in all other substation, George Ellison o.c.b.s are used. A third board in the control room is fed from

a 100 kW B.T.H. mercury arc glass bulb rectifier, and each of its three outgoing circuits is protected by an English Electric air circuit-breaker. Two of the circuits go to the boiler auxiliaries, while the third feeds variable speed motors in the phosphoric acid and triple superphosphate plants.

All cables between buildings are laid direct in the ground, with a protection of cable tiles. In the substations the h.v. is brought into a ring main unit with breakers varying according to the number of transformers involved (four is the maximum, two is usual). The transformers themselves are mounted on concrete rafts outside the substations. Secondary neutral-point earthing presents no trouble, since driven rods give a low resistance to the damp subsoil.



Three Allen turbines drive 1,750 kW Bruce Peebles alternators

All secondary cabling from transformers to substation boards is in Pyrotenax. Ellison o.c.b.s then control p.i.l.c. s.w.a. cables laid direct which feed distribution boards and individual large loads in the factory proper. Where process steam is not to hand, the substations are provided with electric tubular heaters to prevent condensation. B.I.C.C. static capacitors are installed at suitable points around the factory, to a total of 600 kVAr. With the aid of these, the power factor of the electricity demand is kept at about 85%.

Secondary Wiring and Motors

Most of the wiring to motors is v.i.r., or p.i.l.c., s.w.a. in both cases, run on perforated metal racks to which it is fixed by saddles. Standard practice is to run cables either along the wall, or else at ceiling level to feed motors on the floor above. In the latter case suitable feed holes are precast into the reinforced concrete floors. For lighting circuits, heavy gauge steel conduit is standard.

Some 400 electric motors, with aggregate horse-power approaching 8,000, are installed at Immingham altogether. Nearly all of them are B.T.H. s.c. induction motors, totally enclosed and fan cooled. Direct-on starting is employed wherever possible, and no serious difficulties have been experienced as a result of this practice. Where fuse-gear is installed, it is of h.r.c. type, but there is a strong preference for o.c.b.s, which are again of the robust Ellison design. These are almost always equipped with an ammeter, since a check on the load is considered admirable evidence of the condition of machines working for long periods in a dusty atmosphere.

Amongst exceptions to the practice of d.o.l. starting are motors driving large rotary drying ovens (large moment of inertia), and those working on elevators and conveyors which may be submerged in powdered material at starting. In these cases, Ellison hand operated resistance starters are used, in conjunction with B.T.H. slip-ring machines, again totally enclosed because of the working conditions. In the case of the largest motor of all, however, a 400 h.p. machine driving an air blower on the sulphuric acid plant, there is a reversion to direct-on starting, but this time at 6·6 kV.

In this necessarily brief account much of interest that was apparent during the tour of the works has had to be omitted. Short mention must be made, however, to the very extensive conveyor system, which distributes the materials from the docks to the various stores, and thence to the processing sections. The total length is 2¼ miles, and the main sections are extensively interlocked—no mean task when the variety of possible routes is considered. A special control room with a comprehensive mimic diagram has been erected to facilitate operation.

Sir A. Gibb and Partners and Messrs. Maunsell, Posford and Pavry Ltd. were consultants for the services and the external material handling plant, while Messrs. Fisons were responsible for the design and installation of the chemical plant. Messrs. H. J. Cash and Co. carried out electrical installation work for the consultants, while Messrs. F. H. Wheeler (Sheffield) Ltd. were electrical contractors to Messrs. Fisons Ltd.

The electrical installation was designed by the company's power and electrical engineer, Mr. J. B. Hayes.

Problems and Practice IN ENGINEERING

Better Contact Saves Maintenance

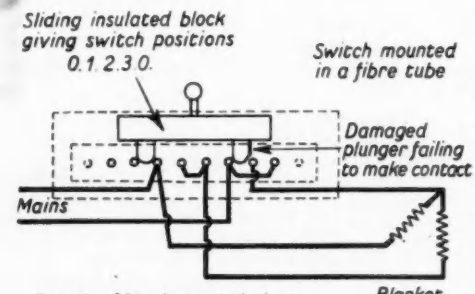
THREE years ago I took up a maintenance position at a cement works, where I found that once a week at least it was the practice to trim up the contacts of the controllers regulating the speed and direction of the motors turning the kilns. On examining these, there was overheating and blackening of both the finger contacts and the rotary shoe contacts supplying the current to the stator of the 3 phase slip-ring motor.

At the first opportunity I checked these contacts with an ohmmeter and confirmed my suspicions that there existed a faulty contact between the copper shoes and the cast-iron base supporting these. A week or so later there was a complete shut down of one kiln and I took the opportunity to remove the faulty shoes. I then tinned the bases and the backs of a new set of shoes which were screwed in position and then soldered together. This proved completely satisfactory and the second controller was treated in the same way a month or so later.

There has been a saving in time, and money spent on buying new shoes and contacts, as previously two to three months was roughly the life of them, now three years have passed and they are still in first class condition.—*S. E. Fisher.*

Switch Trouble

AN electric blanket fitted with thermostatic control and a three-heat switch failed to heat at different times and in various switch positions. Tests showed that the heating element and thermostat were in order.


Sliding insulated block giving switch positions 0.1.2.3.0.
Switch mounted in a fibre tube
Damaged plunger failing to make contact
Mains
Blanket element

Details of blanket switch design

The layout of the switch was as sketched. Close examination of the soft brass plungers disclosed flats on opposite sides caused by the hammering action as the spring loaded plungers rose and fell when passing over the round contact bars. These plungers were a close fit in the locating holes drilled in the sliding insulating block, and the initial flats, once formed, speedily became worse, the plungers having no tendency to rotate and present fresh surfaces.

The wear on both plungers was by no means even, and the close fitting holes in the insulated block greatly reduced any self-aligning action. Consequently, at various positions of the switch, one plunger would span its adjacent bars, and in so doing prevent its mate from doing the same. Depending upon which was the "live" plunger at the time, the circuit was either closed or left open. The sketch shows this.

The switch was restored to use by turning and fitting new brass plungers, but it would appear to be only a matter of time before further trouble is experienced. Such a switch design is compact, but it cannot be termed completely satisfactory.—*R. S.*

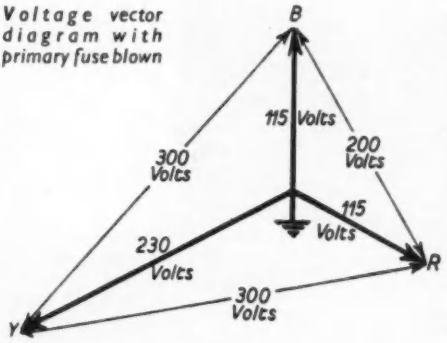
Fuse Unbalances Supply

A FACTORY site is supplied from a three-phase four-wire network at 400 V for power and 230 V for lighting. The network is fed from three one-phase transformers, 6·6 kV/230 V connected in delta on the h.v. side and in star on the secondary sides, with the neutral point earthed. The transformers are protected by a h.v. h.r.c. fuse in each phase between the incoming h.v. feeder and the transformer's primary terminals.

One wintry afternoon a complaint came through that things had gone haywire with the supply. Some firms' motors were running at reduced speed, others had shut down entirely, some workshops had normal lighting, in others lamps were half-glow.

Some of the distribution was on poles, and it was thought that the snow and icy wind had affected the conductors at the points of take-off from the insulators on these poles. A maintenance electrician was sent to find the cause of the trouble and put things right, but he reported later that he was unable to find the

trouble. There was no earth on the lines, and no lines were down. The source of supply was then examined, and the trouble located and remedied. The h.v. h.r.c. fuse in the R-phase



supplying the transformer's primaries had blown, and caused the unbalancing of the secondary voltages, as shown in the vector diagram, so that no consumer had a 400 V supply, and only those workshops whose 230 V supply was connected Y to N had normal lighting. Renewing the h.t. fuse put things normal again.—*B. H. Williams.*

Alternator Field Suppression

IT should be made clear that the remarks in the first paragraph of H.R.H.'s comments on 'Alternator Field Suppression' apply only to machines without damping windings on the rotor, and therefore not in general to turbo alternators. In the latter, a secondary circuit is provided by the solid rotor body and wedges and the damping strips under the wedges so that even with the field windings inadvertently open circuited, the set will continue to supply power (not wattless kVA), provided the magnetising current now required to excite the alternator can be obtained from the bus bars. The set will operate as an induction generator at a speed in excess of synchronism by an amount depending on the characteristics of the damping winding, say $\frac{1}{2}$ - 1 per cent overspeed. There are a number of occasions on record where such conditions have been experienced.

It is very desirable that the excitation should be restored as soon as possible, since the effective current induced in the rotor damping circuit with the machine on loads approaching c.m.r. will be of the order of several thousand amperes and the windings are not designed for continuous operation under these conditions. Severe heating may occur, particularly at the ends of the rotor where the joints between the body and end cap, and also between the damping strips and the end rings, tend to result in high resistance contacts. If the open circuit is due to the inadvertent opening of either main or exciter field switches it is quite permissible to reclose without disconnecting the set from the bars; the unit will pull back into synchronism without surging as the current builds up in the field circuit. More obscure causes of the difficulty will generally necessitate switching out the set to prevent damage due to overheating of the rotor. It is probably sufficient for the loss of field protection to give an alarm, any switching subsequently necessary being manual.

H.R.H. has also overlooked the profound effect of the damping windings in limiting the peak voltage induced in the rotor field when opening the circuit. The formula for the peak voltage Vp given by your original contributor:-

$$Vp = V\frac{(r+R)}{r}$$

is not correct when a damping circuit is present and leads to greatly overestimated voltages with large values of R, or when the field is opened by a switch without discharge resistance. In practice with a solid rotor the effect of the damping circuit and the arcing at the switch is sufficient to limit the induced voltage in the latter conditions to a maximum of about five times the initial voltage for a very short period which should cause no difficulty. Under the same conditions with no damping winding, the peak voltage might be in excess of 20 times the initial voltage, thus explaining the necessity for discharge resistances for D.C. generator and exciter fields or other windings having laminated magnetic circuits.—*V. E.*

Improvements to Cable Boxes

VARIOUS troubles have from time to time been experienced with cable boxes and it would appear that if the following points are kept in mind many can be eliminated. The joints and jointing materials used should be sound in every respect, adequate access should be provided for fitting stress cones on higher voltage cables; cable sockets should have a small countersunk hole ($\frac{1}{4}$ in. will usually suffice) in the top to facilitate soldering. Expansion joints should be provided if there is any possibility of thrust from the cables which would cause damage to bushings or insulators. Cable socket bolt holes should be elongated, or designed in such a manner as to eliminate erection stresses.—*M.I.C.E.*

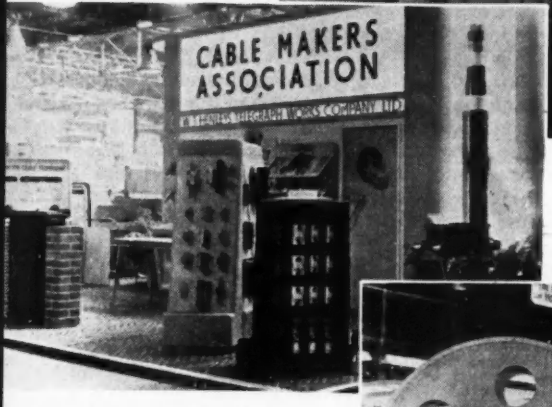
A Flashback

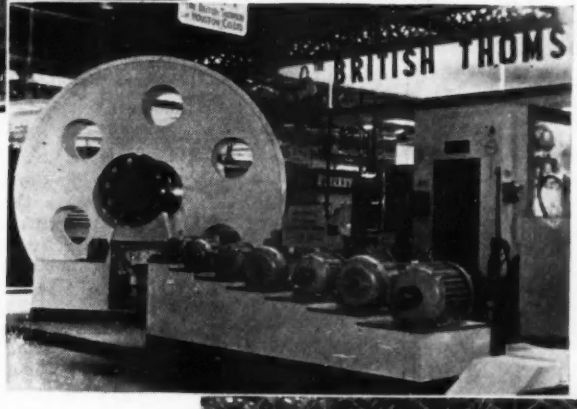
Some of the stands to be

These photographs from Castle Bromwich, Birmingham, taken specially for the Electrical Times make an interesting follow up to our

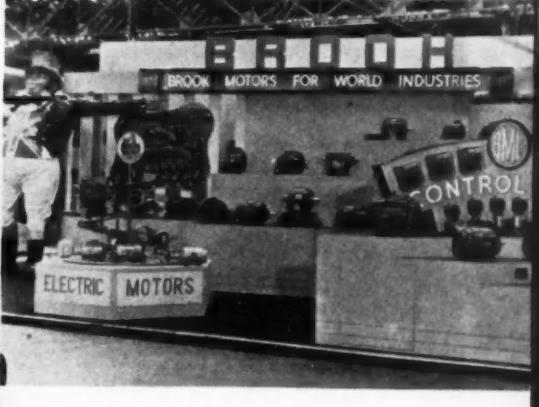
from the Fair

seen at Castle Bromwich





preview of the Fair last week. These are typical of the exhibits of well known firms in the electrical manufacturing industry



An Exhibition on the Doorstep

"IF you cannot spare the time to come to our exhibitions, we'll bring the goods to you." So say George Ellison Ltd., whose new mobile exhibition set out on its maiden tour on Tuesday. Designed by the organisation, the vehicle incorporates features based on experience gained with less ambitious "coaches" in service before the war. The exterior may be described as unassuming, the utilitarian black being relieved only by lines of silver and a nameplate, which, incidentally, is interchangeable so that the vehicle can be used by any of the organisation's associated companies.

In contrast to the unostentatious exterior,

the inside is accommodating and well fitted out. It is lit by fluorescent lamps, and an even temperature is maintained by a thermostatically controlled heater and small exhaust fans in the roof. According to which of the associated companies is exhibiting, the displays consist of Tufnol machined and moulded components, Ellison switchgear, hydraulic valves or grey-iron castings. A settee, desk, library of literature and photographs, dictating machine and radio have also been included in this complete exhibition on wheels, while other features, no less important, comprise a cocktail cabinet, refrigerator and wash basin. Tufnol Ltd. will have the exclusive use of the vehicle this year and it is anticipated that Ellison switchgear will take over during 1952.

View from the rear of the vehicle showing a display of Tufnol goods, and at the end, the cocktail cabinet and refrigerator

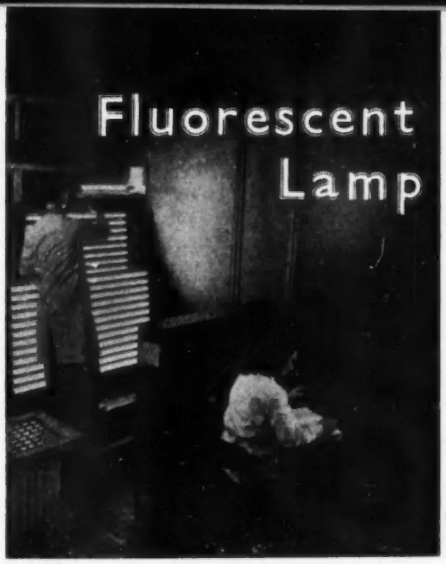
Meters for Moisture

PROFESSOR H. S. GREGORY, Ph.D and DR. L. HARTSHORN, D.SC., were the openers in an I.E.E. Measurements Section discussion, held recently on the subject "Humidity and Moisture Measurement." Professor Gregory dealt with the present state of hygrometry as a science, and sketched out the trend of recent work at Imperial College. Dr. Hartshorn concentrated on moisture meters, and emphasised that nearly all methods of moisture measurements were essentially indirect. This mattered little since moisture content itself was of little intrinsic importance : it usually served as an indication of some other property. Almost any ohmmeter, ammeter, capacity meter or watt meter could be used as a moisture meter, the main problems involved being the attainment of sensitivity, selection of a representative sample, and calibration of the meter with reference to the property of which moisture content is the index. Other variable qualities which affect the meter reading then have to be determined, and this presents the most serious difficulty of all.

In the discussion that ensued, there was general agreement that the correlation of meter readings with moisture content had to be established separately for each application. Amongst "perceptors" which were considered was gelatine with traces of sulphuric acid, giving a 2 : 1 change in conductivity for 5% change in relative humidity. Ceramic elements depending on adsorbed layers of water gave resistance charges of 3 to 4 orders of magnitude over the range 5 to 95% humidity.

The dew- or frost-point hygrometer, in which photoelectric measurement of the light scattered by a layer of condensation on a cooled mirror surface was used as an indicator, was discussed; but it was pointed out that use of this instrument at very high altitudes and low temperatures was limited by the fact that below 80° C the reduction in molecular mobility resulted in a vitreous non-scattering layer.

For sheet materials of uniform thickness, the B-ray weight-thickness gauge was considered to have some applications. As a side line to the main discussion, controversy developed over nomenclature, some speakers wishing to restrict "humidity" to gases and "moisture" to solids, with "hygrometry" applied to both.



Production

Manufacturing methods of Atlas factory at Enfield use latest high-speed machines

In the illustration on the left, the lumen output of a fluorescent lamp is being measured by a 12 ft sphere photometer

MANUFACTURING techniques which have enabled doubling of the guaranteed life of fluorescent lamps were seen in operation at the Enfield factory of Thorn Electrical Industries, Ltd., on Wednesday of last week.

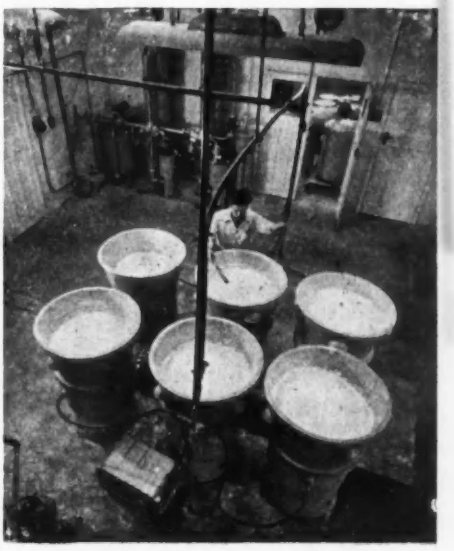
The actual physical life of a fluorescent lamp is normally limited by its cathodes; its useful life, by the progressive falling off in efficiency which occurs in all fluorescent lamps, and there is little point in extending one without the other. Research on cathode coatings including the use of zirconium oxide (ELECTRICAL TIMES, December 14, 1950, p. 936) has succeeded in prolonging cathode life, while developments in phosphors have succeeded in flattening out the curve of decay in efficiency until it is now possible to obtain the same average efficiencies over the longer life as were previously allotted on the basis of a shorter life.

A very large part is played, from either point of view, in stringent control of manufacturing methods and inspection, and the factory which we had the pleasure of inspecting is equipped with the latest types of automatic machinery, some having been obtained from America. The factory's own plant engineering department, which started four and a half years ago with two lathes and a milling machine, has grown to a large and well-equipped department which not only builds the major portion of the firm's own precision automatic machines, but has actually exported machinery to the U.S.

Fluorescent Powders

First department visited was the phosphor plant, said to be one of the largest units in the country, with a considerable export output, where all processes from the first milling of the raw material are carried out. After precipitation from filtered solution, the material is dried and then baked in small crucibles in large furnaces under very accurate temperature control. Upon removal from the furnace, after cooling, a rough check is made under u-v light to detect any impurities which may be present, after which the fired product is broken down to a fine powder and then milled with organic binders and solvents to form a suspension

(Below) A general view of part of the phosphor plant, showing powders before firing



which can conveniently be used for lamp coating. The suspensions are then set aside while one or two experimental lamps are coated and processed, and the batch is not released for production purposes until a satisfactory report is received.

Preliminary specifications for mixing and processing are prepared in the research laboratories at Tottenham, where development work on phosphors is carried out. An interesting new development in view of tungsten scarcity is a substitute phosphor for magnesium tungstate which gives practically the same colour, but dispenses with the use of tungsten.

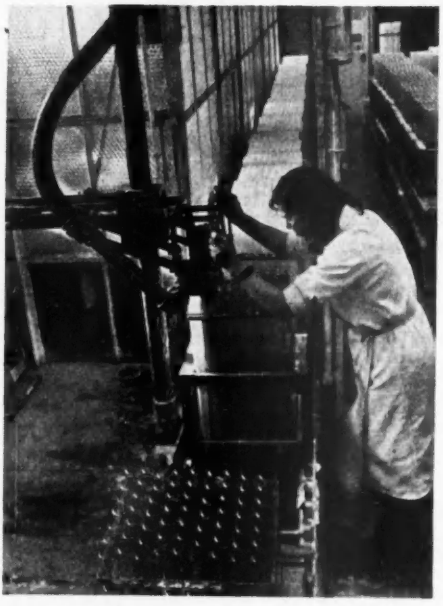
Tube Coating

Glass tubes, arriving from external sources are stacked vertically in racks on a conveyor which first takes them through high-pressure hot-water sprays for washing, after which they are dried and conveyed through the air-conditioned coating room. Here they are coated with the liquid phosphor suspension by means of a multi-nozzle spray equipment which floods the coating over the walls of the tubes up to seven at a time, the surplus liquid flowing out of the bottom, being filtered, and returned to the storage tank. The racks then travel to the baking machine into which the tubes are transferred. Travelling horizontally through an oven, the binder is baked off leaving the powder adhering to the tube. After end-cleaning to facilitate sealing, the tubes travel over an illuminated glass panel and are inspected for such defects as thin or over-thick coating, streaks, ripples, clear spots or scratches. They are then passed on to the sealing machines.

Lamp Assembly

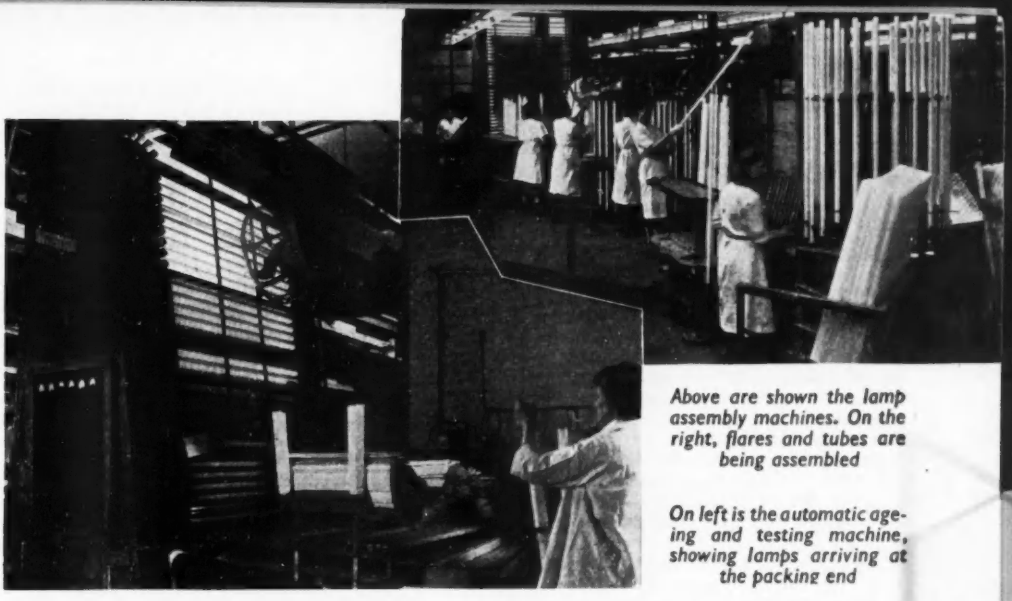
Manufacture of the "flares" or end pieces takes place in a different department, being manufactured from glass tube on automatic machinery very similar to that employed in making the "pinch" of an ordinary incandescent lamp. The two types of flare, one with and one without a glass sealing-off tube have the filaments mounted and are coated with emissive material by hand processes.

The high-speed machinery for assembling the lamps is believed to be unique in this country. The first machine seals in the "blind" flare in the first half revolution, when the tube is reversed; the flare having the exhaust tube being attached in a similar manner in the second half of the revolution. The tubes are then transferred to the rotating table of the exhaust machine, the exhaust tube being inserted into a rubber seal. Vacuum is applied and the walls of the tube baked by passing through an oven, thus de-gassing, after which argon and a measured quantity of mercury are introduced at successive stages and the exhauster tube is sealed off. Caps are then threaded on to the electrode wires and the lamps passed to a further machine which cements on the cap and solders the wires to the pins.



(Above) An operator is coating tubes, a row at a time, with a multiple spray. The coated tubes are seen proceeding towards the air-lock into the drying room. The coating room is air-conditioned and is isolated from the drying room owing to the use of inflammable solvents

On left, the tubes are seen emerging from the drying oven after coating. Inspection takes place over the lighted glass panel in the foreground



Above are shown the lamp assembly machines. On the right, flares and tubes are being assembled

On left is the automatic ageing and testing machine, showing lamps arriving at the packing end

Next step is the ageing and testing machine on to which the tubes are loaded through a gauge which applies a length check and automatically rejects any lamp not within the specified tolerances. The ageing conveyor has 96 pre-set ageing positions at which the cathodes are heated and the arc is struck. A number of tests are made automatically by photo-electric cell, and blinking, swirling, refusing to strike or not giving correct output are noted. Failure to pass any one of the test stages results in the energising of the machine's "memory" circuit so that when it leaves the conveyor it is automatically rejected for further examination and test, instead of passing to the packing department with the others. "Quick start" lamps receive a further water-repellent coating before packing.

Quality Control

After packing the lamps are held for 24 hours, pending the results of extended tests from random specimens—should these be not up to specification, the entire batch is returned for re-inspection and re-testing. A number of lamps are held for three weeks and then re-tested. Quality control is also extended to half-hourly checks on main production processes.

Lamp Caps

An opportunity was also afforded to inspect the lamp cap factory, one of the only two such factories in the United Kingdom, where mass production of all types of lamp caps for home and export was seen in operation. A number of ingenious machines seen included follow-on presses with as many as nine and ten tools, commencing at one end by punching a circular blank from brass ribbon and transferring it through several drawing processes, delivering the shell at the other end. Machines for rolling the threads into E.S. caps and inserting and riveting the pins into bayonet type caps were also seen in production. Assembly of the caps took place on rotating multi-stage machines, where the contacts, punched from ribbon were inserted and riveted after the cap had been filled with molten vitrite, being then cooled and ejected with a blast of compressed air. Acid pickling was carried out by the batch process in baskets, but it is understood that automatic conveyor pickling is under consideration. We were particularly impressed with the thoroughness of the inspection which, in addition to normal quality control methods, includes visual inspection of individual caps both inside and outside, on conveyor belts.

Plant Engineering

The work of the plant engineering department has already been referred to, and it should be noted that in addition to building precision machines it carries out design and maintenance work for ten other factories in the Thorn group, in addition to machinery for exports. History was made in January, 1949, when the first of a series of automatic filament-mounting machines was shipped to U.S. to perform operations hitherto carried out by hand.

Equipment noted included a Rowbotham cam-cutter for precision cutting of cam profiles of all types. Some idea of the quality of workmanship available was given by an account of a machine constructed without drawings.

overseas news

Japan's Reorganisation

The plan to reorganise the Japanese electric power industry (see ELECTRICAL TIMES, January 18) made progress by the recent directive issued by the Public Utilities Commission to the Japan Electric Power Generation and Transmission Co. (Nippatsu), and the nine power distribution companies. It had earlier been decided that the Nippatsu organisation should be disbanded and the power industry segregated into nine sections covering the whole country. By the Ordinance of December last, the Public Utilities Commission was formed. Under the new directive, which approved recommendations made by the distribution companies and a part of the recommendations by Nippatsu, there would be a payment of special dividends to Nippatsu shareholders upon liquidation of the company, and the nomination of 215 directors and auditors of the projected nine power companies to be set up under the reorganisation scheme. To these nine companies the various power plants now under construction would be allocated. The Nippatsu concern has since voiced strong protest to the direction, in particular to the personnel list, which allots 135 seats (more than 60% of the total) to the distribution firms, 49 to Nippatsu and 31 to other individuals. This has caused recriminations on both sides, necessitating Government intervention.

More Packaged Units

As foreshadowed in our April 19 issue, Brisbane City Council has now placed an order with the Australian General Electric Pty. Ltd., acting as agent for the General Electric of America, for a 10,000 kW "package" generator, valued at £850,000. The necessary dollars have been made available by the Commonwealth Government. The complete unit, which is scheduled to be in Australia by June, 1952, will be housed in a fabricated steel building alongside the bigger conventional power house under construction at Tennyson. This contract brings the total such sets ordered to well over twenty. New South Wales, Victoria and Queensland, all of which have placed orders, are jostling for priority in delivery. Victoria has twelve on order, New South Wales eight and Queensland one. Sydney's first one, by the way, arrived last month.

N.S.W. Railway Electrification

A contract, valued at approximately £3 million, for the design, supply and installation of overhead equipment for the electrification of the railway between Parramatta and Lithgow, New South Wales, has been awarded to British Insulated Callender's Construction Co., Ltd. The work comprises an extension of the present 1,500 V electrified system which runs from Sydney to Parramatta and will enable electric stock to proceed to Lithgow in the heart of the western coal-field area. A total of 236 single-track miles are to be equipped and these include four tracks between Parramatta and Doonside and two tracks from Doonside to Lithgow. The electrification work will be comparatively straight-forward up to the point where the railway enters the Blue Mountains at Penrith but beyond this point awkward curves and steep gradients are encountered—the gradients between Katoomba and Valley Heights being particularly severe—and it is to enable the hauling of heavy coal freight trains and to cater efficiently with the rather arduous route that electrification of the line has been projected.

B.C. Expansion

A recent amendment to the Electric Power Act increases the borrowing power of the British Columbia Power Commission from $45 million to $60 million in order to carry on its expansion programme, which includes the Elk River power potential as well as the development of Puntledge river.

The Commission, by the way, is disposing of its electric power systems at Hope and Lillooet to the privately owned B. C. Electric Co., Ltd., for those two territories are isolated in the area of the company. The action was taken after consumers had complained that the B. C. Electric Co. could supply them more cheaply. The Commission, in fact, has been taking a bulk supply from the company to retail in Hope.

Manitoba Plan

The Bill to provide for the setting of the Manitoba Hydro-Electric Board ("E.T.," April 26) has made considerable progress in the Province Legislature, the Second Reading having been carried with only three dissenting votes. The Government favours the plan to purchase the Winnipeg Electric Co., and has put forward a formula for the price. This provides that the basic factor would be original cost of plant to the first owner, less depreciation of not less than 80% of the company's depreciation account. To this the valuer may add up to 10% of the original cost in compensation. This has brought strong protests from the Winnipeg Electric Co., who state that the proposed formula denies the company adequate compensation for its properties, and sets up a procedure which makes a true valuation impossible. Mr. W. H. Carter, president of the company, disclosed that when approached for a valuation by the Premier last October, he submitted a price, (believed to be $70 millions).

In the meantime, another development in the Provincial power plan is reported. Many members of the Winnipeg City Council are stated to be in favour of a scheme for the sale of the Council's generating plants to Manitoba Hydro-Electric Board, while retaining the sole distribution rights in the city, including the purchase of the Winnipeg Electric Co.'s system. If this scheme is approved, the Board will have sole control of power generation in the Province.

Change-Over

All possible heavy industry in Hamilton, Ontario, will be converted to 60-cycle power before the end of the year, and the Hydro-Electric Power Commission of Ontario will build a $2,050,000 60-cycle transformer station near Kenilworth Avenue and Burlington Street for the programme, it was disclosed a few days ago. Apparently, this course has been decided upon to avoid the possibility of severe power shortage on the 25-cycle system in Southern Ontario.

The Elusive Certificate

Although he had had 16 years' experience as a master electrician in Hamilton, Ontario, an applicant for a master electrician's certificate in Toronto was recently refused that award. The applicant is required to pass a journeyman's test and then wait two years before he can apply for his master's certificate. Apparently the licensing regulations do not allow both exams to be taken at once. But this interesting point is being taken further by the parties concerned.

Austria's Part

Further steps towards making Austria the power generating station for Central Europe have now been announced. Near Huben, in the East Tyrol, a storage works has been begun which will provide 250 million kWh yearly. This scheme is being built jointly with Italian and Austrian capital, and the power produced will be shared between the two countries equally. During the coming year, near Jochenstein on the Austro-Bavarian frontier, work will begin on a power generating plant on the Danube. This works will produce 750 million kWh a year, half of which will go to Germany. The cost of the scheme will be borne jointly by Austrian capital and the Rhine Main Danube Company.

Within the next few weeks work will also begin on a new power plant on the Inn River, near Braunau. This will produce 500 million kWh a year, half of which will be delivered to Germany, which is bearing part of the cost of construction.

Swiss Increase

In Switzerland, 16 power stations are under construction or being rebuilt at the present time, the Swiss Electricity Users' Association was told at its recent meeting. These will provide an additional 2,000 million kWh annually by 1956. Last year, four large power stations and several smaller units were put into operation.

State Boards

Another State Electricity Board that has been formed under the 1948 Electricity (Supply) Act of India is that for Madhya Pradesh, which is to be composed of ten members appointed by the State Government to represent the various interests. Thus there will be members representing commerce, transport, agriculture, labour, village industries, State owned and aided industries, etc. The Board's chairman is Col. E. G. Mackie, formerly chief engineer and manager of the Madhya Pradesh Electricity Dept., other members being Mr. V. Sheshasayee, comp.I.E.E. (commerce member) and Mr. S. Raghavachar, formerly of the Mysore State Government Service.

So far only two State Electricity Boards have been set up—the other being for Delhi—but Bombay's Minister for Public Works recently expressed the hope that the Board for that State would shortly be formed, for the 1948 Act owed its existence to the initiative of the Bombay Electric Grid Dept., he said. Meanwhile the period by which the State Boards are to be established has now been extended to March 31, 1952.

The Noxious Weed

The abundance in the Vaal River of a weed—water hyacinth—is causing concern to the Electricity Supply Commission of South Africa. At a meeting of concerns affected by the plant, Mr. W. J. Hirschveld, of the Commission, said there was no particular danger from the weed as long as it floated, but if it sank, either because of chemical spraying or due to frost, it could easily be sucked into the Vereeniging power station's cooling system and cause extensive damage. Two methods of eradicating the plant could be used—a mechanical system or chemical spraying, but the latter method left a "stinking mass which floated on the river for some considerable time." A labour force of 100 is being provided to destroy the weed.

Borneo Project Dropped?

The proposed hydro-electric scheme for Borneo, which was to have been constructed in connection with the establishment of an aluminium plant, is now unlikely to be proceeded with, according to Mr. W. P. Pinckney, chairman of the Sapong Rubber Estates, whose territory would have been affected by the scheme. The British Aluminium Co., Ltd., were interested in the project, which was known as the Padas River scheme. Last May, Mr. R. W. Cooper, chairman of the company, referred to the scheme, stating that large sums of money would be involved. It is understood that financial assistance would have been necessary from the Colonial Development Corporation. On behalf of the British Aluminium Co., however, it was stated last week that no decision had yet been reached, the matter still being in front of the Ministries concerned.

PERSONALITIES

IN THE INDUSTRY

Station superintendent at Barking generating station, London Division, B.E.A., **Mr. C. L. Jaques,** M.I.Mar.E., M.Inst.F., has been selected as generation engineer (operations)—Southern group in the Eastern Division of the B.E.A. Mr. Jaques has been chief at Barking since 1948, after four years as deputy station superintendent. Educated at East Ham Technical College, he joined Clarke, Chapman Ltd., in 1936, as a testing engineer, going to Bradford Corporation the following year. Returning south in 1938, he was combustion engineer at the Barking and Littlebrook stations before his appointment as mechanical repairs engineer at the latter station in 1939. He transferred to Barking in 1944, originally as boiler plant repairs engineer. Mr. Jaques was a member of the Industry's Productivity Team which visited America in 1949. He is shortly to take up his new duties.

Mr. C. L. Jaques

The new president of the Dumfries and Galloway Electrical Society—for the 1951-52 session—is **Mr. S. H. Money,** Assoc.I.E.E., sub-area engineer, Dumfries and Galloway sub-area of the South-west Scotland Electricity Board. Vice-president is **Mr. R. D. M'Craith,** electrical contractor, of Castle Douglas, with **Mr. W. H. Clarke,** Assoc.I.E.E., of Kirkcudbright, as secretary.

Mr. H. D. Bell, having taken up permanent residence abroad, has resigned his directorship of Aberdare Cables Ltd. **Mr. J. P. Gilliver,** secretary, and **Mr. A. J. Nicholas,** director and general manager of South Wales Switchgear Ltd., have been appointed to the board.

Mr. W. Foster

Until recently outside general sales manager of the Creda Division of the Simplex Electric Co. Ltd., **Mr. W. Foster** has resigned that post in order to join J. H. Robinson and Co., (Liverpool) Ltd., as a director. Mr. Foster has been associated with Simplex since 1932, occupying the positions of manager, North Western area; manager, North of England, and general sales manager, Creda Division.

The new president of the Batti-Wallahs' Society is **Sir John Hacking,** M.I.E.E., deputy chairman (operations) of the B.E.A., who succeeds **Mr. H. Nimmo,** M.I.E.E., M.Inst.C.E., M.I.Mech.E., in that office. **Mr. T. C. F. Bigland** has been re-elected honorary secretary and treasurer, and **Mr. J. Temple Hazell** is again assistant honorary secretary. The following members have been elected to the committee: Messrs. M. D. Cloran, J. W. Perkins, J. W. Porter, A. G. Freeborn, A. N. East, J. Nelson, with Mr. J. W. Woolley as co-opted member.

Hall and Pickles Ltd. announce the appointment of **Mr. F. R. Robbins** as general sales manager to the company. For the past three years he has held the position of manager, resistance alloys, but he now assumes responsibility for the general direction of sales policy throughout the company.

Mr. F. R. Robbins

An official B.E.A. team left for America in the *Queen Mary* last week to study methods of managerial control of electrical utilities and the development and co-ordination of consumer service activities. Leader of the team is **Mr. C. T. Melling,** M.Sc., M.I.E.E., M.I.Mech.E., chairman of the Eastern Electricity Board, its other members being **Mr. R. R. B. Brown,** B.A., B.Sc., M.I.E.E., deputy chairman, Southern Electricity Board, **Mr. D. B. Irving,** B.Sc., M.I.E.E., chief engineer, London Electricity Board, and **Mr. J. F. Smith,** B.Sc., M.I.E.E., chief commercial officer, South Wales Electricity Board. Their visit has been sponsored by **Mr. Philip Sporn,** director of the American Gas and Electricity Co., whose organisation will be one of those examined. Visits will also be paid to the Consolidated Edison Co., Potomac Power Co., the T.V.A. System, Rural Electrification Administration and the Edison Institute. Mr. R. R. B. Brown, by the way, is now in Australia visiting his parents in New South Wales. He will fly to San Francisco, joining the party there. The team is expected back at Southampton on May 29.

On Saturday last, **Mr. F. G. Wraith,** manager of the Melbourne and Metropolitan Tramways Board arrived in this country by air from Australia. One of the purposes of his visit is to recruit more tramway employees.

Mr. Harold Neal, M.P., has been appointed Parliamentary Secretary to the Minister of Fuel and Power in succession to **Mr. Robens,** who is now Minister of Labour. Among other Government changes, the **Rt. Hon. Richard Stokes,** M.C., M.P., becomes Lord Privy Seal, with additional responsibility for a new department to be set up to deal with raw materials.

At last Thursday's annual meeting of the London Chamber of Commerce, **Sir Frank Nixon,** K.C.M.G., C.B., was re-elected president. Among the new members of the council are **Mr. J. P. Ford,** director and general manager, Associated British Oil Engines (Export) Ltd., and a director of Brush (Export) Ltd., and **Mr. F. G. Mitchell,** chairman and managing director of Mitchell Engineering Ltd. and of associated concerns.

Manager of the Lighting Fittings Department of the General Electric Co. Ltd. for the past 20 years, **Mr. A. J. Burbidge** has retired. He had been with the company since 1905 and had since served in every position of the Lighting Fittings Department. He was president of E.L.F.A. from 1946-1948 and was that association's representative on the Fair Trading Council for many years.

Mr. A. J. Burbidge

Mr. W. G. Weston, A.C.I.S., M.I.I.A., secretarial officer, Norfolk Sub-Area, Eastern Electricity Board, has been elected vice-chairman of the Norwich Centre of the Institute of Industrial Administration after having retired from the office of hon. secretary. Mr. Weston is a founder member of the Norwich Centre and has been hon. secretary since its inauguration in February, 1947.

A. C. Cossor Ltd. announce that **Mr. L. L. Roberts,** general manager of the company, and director and general manager of Cossor Radar Ltd., has resigned from those posts to take up a position with Rootes Ltd. in connection with their export business.

Mr. Ian Jeffcott, L.R.I.B.A., has been nominated by the Radio Industry Council as consulting architect for the Radio Show, to be held at Earls Court from August 29 to September 8.

Newly elected chairman of the Council of the Institute of Export for the 1951-52 session is **Mr. D. Maxwell Buist,** M.I.E.E., export director of the British Electrical and Allied Manufacturers' Association. The new vice-chairman is **Mr. J. P. Ford,** director and general manager of Associated British Oil Engines (Export), Ltd.

Mr. E. F. Gatling has been appointed London area general manager for British Relay Wireless Ltd. and associated companies.

After 50 years' service in the electricity supply industry, **Mr. W. E. Budding,** A.C.I.S., is retiring from the position of assistant commercial manager, British Electricity Authority. Mr. Budding started with the South Wales Power Co. in 1901, shortly after its incorporation, and became personal assistant to the general manager, the late Mr. W. A. Chamen, and then to his successor, the late Mr. J. W. Beauchamp. Following acquisition of the South Wales Power Co. by Edmundsons Electricity Corporation, Ltd., Mr. Budding was promoted in 1935 to Edmundsons' head office (general management) in London, with direct responsibility to the managing director and the general manager, and was also in charge of all parliamentary work for Edmundsons' numerous associated statutory companies. Following the vesting of the industry under the 1947 Act, he was appointed to the position of assistant commercial manager, B.E.A., from which he is retiring.

Mr. W. E. Budding

The Brush Scholarship for 1951, valued at £150 per annum for three to four years, has been awarded by the Brush Electrical Engineering Co., Ltd. to **Derek Joyce,** an engineering apprentice, who is to join Nottingham University in October, his special interest being turbines.

Mr. W. J. Chalk, B.A., has joined the staff of the Overseas and Engineering Information Department of the British Broadcasting Corporation to deal mainly with work connected with the allocation of wavelengths for broadcasting, and to take part in international and other conferences on this and related subjects. On such matters he has had considerable experience.

At the annual general meeting of the Aluminium Development Association recently, **Mr. Austyn Reynolds,** B.A., A.M.I.Mech.E., A.F.R.Ae.S., was elected President for the year 1951-52 Mr. Reynolds is a director of Tube Investments Ltd. and deputy chairman of T. I. Aluminium Ltd. and the associated Aluminium Companies. He has served on the A.D.A. Council for six years and was vice-president during 1950-1. The new vice-president is **Mr. H. G. Herrington,** High Duty Alloys Ltd. **Mr. F. G. Woollard,** M.B.E., M.I. Mech.E., M.I.P.E., M.S.A.E., was re-elected Chairman of the Executive Committee.

Mr. A. Reynolds

Mr. Harold Parker, ASSOC.I.E.E., C.M.B.H.I., has been appointed managing director of Walters Electrical Manufacturing Co., Ltd., one of the oldest makers of electrical instruments in this country (they were established in 1880). Mr. Parker has been with the company since 1927, prior to which he was in charge of the stock and supply department of Metropolitan-Vickers Electrical Export Co. in India (which then also covered Pakistan, Burma and Ceylon). He fills the position lately occupied by **Mr. E. E. Moore,** M.I.E.E., who, having retired after over 50 years' service with the company, has been appointed chairman.

Mr. J. Field has been appointed general superintendent of the Victoria State Electricity Commission's power and fuel centre at Yallourn. He has been assistant general superintendent at Yallourn since December, 1946, and became acting general superintendent last December on the retirement of Mr. W. Morrison.

The long and honourable record of **Mr. E. M. Ashworth,** as general manager of the Toronto Hydro Electric Commission came to an end this week, with his retirement. Mr. Ashworth was closely associated with the late Sir Adam Beck, the founder of the Hydro Electric Power Commission of Ontario. He served as secretary of the Ontario Municipal Electrical Association when that organisation was actively supporting the formation of the Ontario Commission. It was in 1910 that he joined the Toronto H.E. Commission, and he has been general manager since 1924. He is now succeeded in that position by **Mr. Herbert MacTavish,** formerly the assistant manager, who has been with the Commission since 1924.

One of the recipients of the B.E.M. mentioned in our April 12 issue was **Mr. J. B. Inglis** (*not* J. B. Boyd), a foreman linesman from the Plymouth Transmission Section of the South Western Division of the B.E.A.

Following the promotion of **Dr. E. R. Cooper,** M.SC.(N.Z.)., PH.D., as assistant secretary (Physics and Engineering) of the New Zealand Department of Scientific and Industrial Reseach. **Mr. A. G. Bogle,** B.E., D.Phil (OXON)., A.M.I.E.E., A.M.N.Z.I.E., has been appointed director of the Dominion Physical Laboratory. Mr Bogle was previously chief electrical engineer of the laboratory.

Mr. K. H. R. Lauben

Mr. K. H. R. Lauben has been appointed a director of E.M.I. Sales and Service Ltd. It was in 1947 that he became manager of the Distribution Division covering the storage, shipment, invoicing, tabulating and distribution depot control for the whole range of products now distributed by that concern. He has been associated with the company since 1915.

Formerly personal assistant to the South Western Divisional controller, **Mr. H. F. R. Taylor,** A.M.I.E.E., has been appointed chief assistant engineer to the system operation engineer at the headquarters of the B.E.A. Since 1934, Mr. Taylor has been located at Bristol, holding various posts in the Operation Department of the C.E.B., S.W.E. and S.W. Area, and becoming senior assistant operation engineer prior to vesting day. He gained earlier experience at Southport and at the Valley Road power station, Bradford. He received technical training at Liverpool Technical College and later studied Law at London University.

Mr. H. F. R. Taylor

One of the two British speakers at the Conference of the Association Francaise des Eclairagistes, held in Paris last week-end, was **Mr. R. L. C. Tate,** F.R.S.A., of the London Lighting Service Bureau. Dr. R. G. Hopkinson, of the Building Research Station, was the other. Mr. Tate read a short paper in French on three outstanding British lighting installations—Beverley Minster, Yorkshire, the new House of Commons, and the Royal Festival Hall.

For the second year in succession a member of the staff of the Yorkshire Electricity Board has won the National Trophy of the E.D.A. Public Speaking Competition. At a luncheon held last Friday, presided over by **Mr. F. Newey** (deputy chairman, Y.E.B.), **Mr. F. Nicholls** (manager Leeds sub-area) presented the awards. **Miss B. Hanforth** (Leeds) received the National Trophy and plaque, and **Mr. K. Prescott** received a certificate as winner of the Yorkshire and North Eastern Area Competition. **Miss M. O. Morris** (Sheffield sub-area) was unable to attend and her award, the certificate of merit for second place, was received on her behalf by Miss M. Bradshaw. Present at the luncheon were all the competitors who took part in the Area Competition, also **Miss L. M. Kaye** (Sheffield sub-area), last year's winner, **Mr. A. Haselhurst** (chief commercial officer, Y.E.B.), **Mr. C. R. Taylor** (commercial officer, Harrogate sub-area N.E. Board), and **Mr. E. H. Gregory** (public relations officer, Y.E.B.).

WILLS.—Mr. H. J. Carter, managing director of the Carter Electrical Co., Ltd., left £8,561 (£7,733 net value).

Sir Allan Gordon-Smith, K.B.E., D.L., F.B.H.I., founder of S. Smith and Sons, and associated companies, left £60,260 (£464 net value).

Dr. Edward Mallett, D.SC., M.INST.C.E., M.I.E.E., F.INST.P., principal of Woolwich Polytechnic, left £15,528 (£14,827 net value).

Sir Arthur Preece, LL.D., M.INST.C.E., M.I.E.E., partner in Preece, Cardew and Rider, left £36,124 (£35,989 net value).

CONSTANT CURRENT PROPULSION

Metadyne Control Applied to a Ferry-boat

THE metadyne-controlled constant-current system has been used by Metropolitan Vickers for the propulsion machinery of T.S.M.V. *Royal Iris*, built for Wallasey Corporation Ferries by Denny Bros.

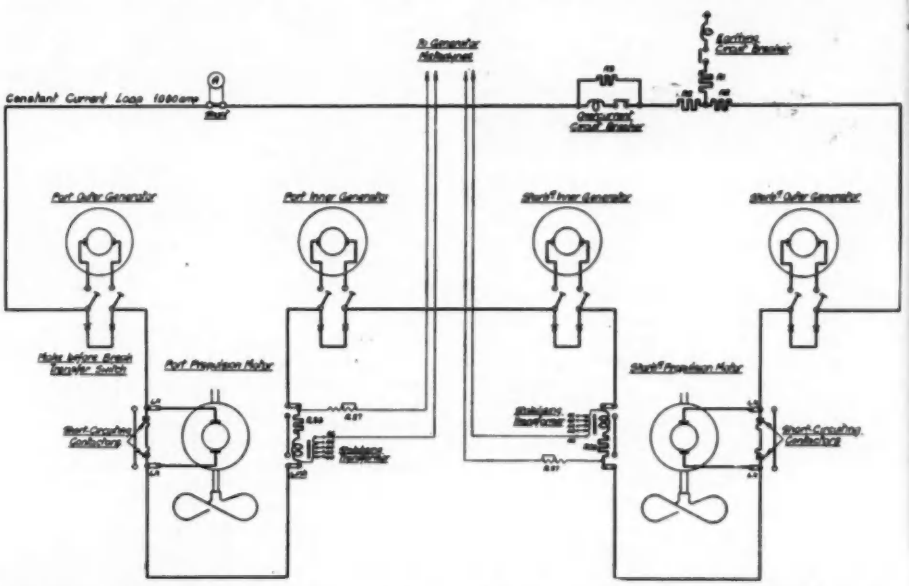
In this system four 300 kW generators are connected in series with the two propulsion motors, each generator giving a rated output of 730 h.p. at 215 r.p.m. or 540 h.p. at 195 r.p.m. with a loop current of 1,000 amps. Owing to the constant-current system, any generator or motor can be cut out merely by short-circuiting it. The initial increase of current at the moment of short-circuit causes the metadyne exciters to respond and reduce the generator field current, which restores the circuit to its initial conditions. Overriding control is exercised by varying the metadyne field currents.

These field currents are controlled either in the engine room or on the bridge, and without the use of any automatic devices. The system renders overload on the engines impossible no matter how rapidly the manœuvring control gear is operated.

Each of the four 300 kW 300 V main generators has a single pedestal bearing and is solidly coupled to a Ruston and Hornsby pressure-charged marine oil engine. To the non-driving end of the generator is connected a 50 kW 220 V d.c. generator, the engine and generators being mounted on a substantial bedplate of deep section.

The diesel engines, made by Ruston and Hornsby, are four-stroke, six-cylinder machines developing 540 h.p. at 500 r.p.m. Two auxiliary diesel generators each developing 80 h.p. at 800 r.p.m. are also installed.

The control desk for the main propulsion houses the controllers for the propulsion motors, switches for the generators, changeover switch for the two metadyne sets (one being a standby), changeover switch for bridge to engine room, and protective and indicating gear.



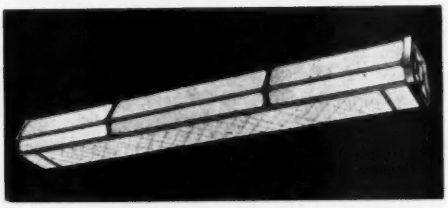
Each metadyne set consists of two 4·5 kW metadynes for the propulsion motors, a 29-h.p. 220 V 1,450-r.p.m. driving motor and a 10 kW metadyne for the generators.

Short-circuiting contactors for the propulsion motors and the automatic starters for the metadyne sets and ventilating fans were made by the Watford Electrical Manufacturing Co. Ltd.

The BUYER'S *Column*

New Fluorescent Fittings by Ekco

NOW being marketed by EKCO-ENSIGN ELECTRIC LTD., Vigo Street, London W.1, is a new range of decorative fluorescent fittings for commercial and similar interiors using glass as the diffusing medium instead of "Perspex" and applying the minimum amount of steel. They are both attractive and useful additions to the extensive Ekco range and their production has been specially planned to take care of the present shortage of materials. The range comprises: F1000, a decorative 5 ft fitting with diffusing glass panels and bottom louvres—two 80 W 5 ft lamps. F1001, a decorative enclosed 5 ft fitting with diffusing glass panels—two 80 W 5 ft lamps. F1002, a decorative semi-indirect



This is the F.1000 model, a decorative 5 ft fitting with diffusing glass panels and bottom louvres for two 80 W 5 ft lamps which is in the range recently introduced by Ekco Ensign

5 ft fitting with diffusing glass panels—two 80 W 5 ft lamps. F1004, comprising glass vallance F1003 on 5 ft basic fitting FF17—one 80 W 5 ft lamp, and F1005, a decorative semi-indirect 4 ft fitting with diffusing glass panels—two 40 W 4 ft lamps.

These new fittings are being exhibited on Ekco-Ensign Stand No. C.403 at the B.I.F., Birmingham.

Price Changes

RECENT increases announced by manufacturers on account of rising material costs and other factors include those of:

The ENGLISH ELECTRIC CO., LTD., Queens House, Kingsway, London W.C.2, who announced the following retail list prices effective from May 1, 2009 Cooker, £34; 2009D Cooker, £35 15s. The E.E. washing machine is now £55 plus purchase tax. All spare parts are now subject to a 10% increase in price.

GENERAL AUTOMATIC IRON LTD., 13 Commercial Road, London E.1, makers of "Systym" automatic irons, who also announce increases with effect from May 1. The "Golden Arrow" a.c. model costs 34s. 6d., the a.c./d.c. model being 39s. 6d.; the "Silver Arrow" a.c. model costs 38s. 6d., for the universal model the price is 42s. which is the same as the "Plastic de Luxe" a.c. model. This model, for a.c./d.c. supplies, now costs 45s. 6d.

Announced by H. FISHER (OLDHAM) LTD., Oldham, Lancs, makers of washing machines and drying equipment, are new prices effective from April 30. These increases are incorporated in a new Home Trade price list No. 1 now being distributed.

This Beanstalk needs no Jack

NOW in production by the mechanical developments division of WILLIAM MOSS AND SONS, LTD., North Circular Road, Cricklewood, London N.W.2, is a range of "Beanstalks" which will suit all trades and applications.

These "Beanstalk" hydraulic working platforms suit "anybody in need of elevation." They are easily raised, lowered and manoeuvred by one operator without assistance. Controlled from the working platform the telescopic ram is extended by operating the pump. To lower, the operator pulls the pressure release control. There are four models now available all of which may be power operated or manually operated as desired. They are a 30 ft working height model, a baby model with 18 ft working height, a trailer model which has a working height of 25 ft and is quickly detachable for use inside buildings and a model with umbrella framework for conveying in small lifts.

The usefulness of a "Beanstalk" is most apparent. Special applications in the electrical industry are for installation and maintenance work, maintenance of lighting equipments, together with a host of other applications.

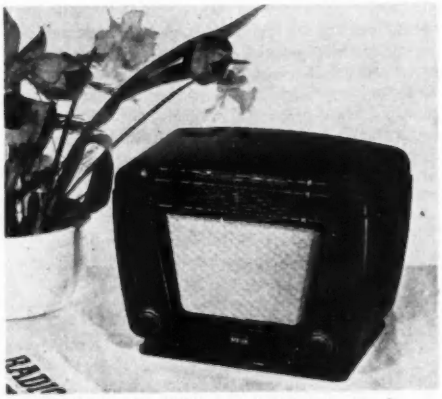
An obvious application of the "Beanstalk"

"Stella" Radio and Television Models arrive

STELLA RADIO AND TELEVISION CO., LTD., Oxford House, 9-15 Oxford Street, London W.1, announce the first models of their range, comprising two radio and two television receivers. Distribution will be exclusively through a limited number of wholesale distributors.

Model ST.100U is a 5-vale, all-wave table superhet for a.c./d.c. mains, 100-120 volts or 200-250 volts. It is ideal as a "second set," its small size and light weight making it very easily transportable. There are three wavebands, long, 740-2,000 metres, medium, 187-580 meters, short waves, 25 and 31-metre broadcast bands, which are bandspread.

Model ST.120A is a 5-valve, all-wave table superhet for a.c. mains, 100-250 volts. Wave



The Stella ST. 100U model which is due for release June 1

ranges covered are: long, 715-2,000 metres, medium, 185-580 metres, short, 16·5-50·5 metres. A particularly beautiful plastic cabinet with a wood-grain finish houses this receiver, which gives excellent reproduction. A special feature is a new five-position switch giving three differing tone values for radio listening and two for gramophone reproduction.

Of the two television receivers, Model ST.1522U is a superhet (vision and sound) table model with a 12 in. C.R. tube. It is designed for a.c., 200-245 volts or on d.c. mains, 200-245 volts. This receiver has been specially designed to take up the minimum of space in the home and yet allow 12 in. screen viewing. A special feature is the incorporation of interference limiters on both sound and vision channels.

Model ST.1480U is a console version of the table model ST.1522U. The screen is at the right height from the ground to afford very comfortable viewing. Doors for the protection of the screen are an additional advantage, these doors are folded back when the set is in use. The cabinet is of grained walnut. These models are available from June 1.

The Electropower speed reducing gear coupled with a horizontal motor

Geared Motors for all Applications

RECENTLY announced by ELECTROPOWER GEARS LTD., Kingsbury, London N.W.9, is a new range of geared motors and speed reducers, covering the range from 1/10th to 27 h.p., with a standard minimum speed from 6 r.p.m. up to 556 r.p.m., a very large selection of speeds in between this range is available on double and triple reductions. They are also able to offer apart from single speed motors, alternatively 2, 3 or 4 individual speeds, by means of fitting pole change type motors. Any type or make of motor can be fitted, subject to the physical dimensions being suitable.

All gear boxes are of the spur wheel type, very silent in operation, and are used for practically every industrial purpose, and are eminently suitable for building into most types of machine tools and manufacturing plant generally.

The range includes standard horizontal geared motors and gear boxes, vertical flange type geared motors and gear boxes, single worm reduction geared motors.

This new range of geared motors and speed reducers embodies the latest advancements in design, gained from experience and specialised knowledge of this type of equipment.

New Stripslides in Installation and Transmission

TWO new "Stripslides", 35 mm instructional filmstrips, are now available dealing with electrical installation work and overhead power transmission.

The first part of the former deals with the construction, manufacture and installation of "Pyrotenax" cable. The second part provides examples of wiring in "Channel" conduits.

Stripslide No. 80 (the second mentioned) deals with overhead electric power transmission lines, towers, terminals and line equipment covering the voltage range 33 kV to 275 kV.

These filmstrips which are suitable for use in tecnnical colleges are produced by STRIPSLIDES, LTD., 93 Cheyneys Ave, Canons Park, Edgware, Middx., and distributed by DANCE-KAUFMANN, LTD., 18 Upper Stanhope Street, Liverpool 8.

THE WEEK

COMMERCE *in news* INDUSTRY

Distribution of Sulphur

DETAILED allocation schemes for the distribution of sulphur and sulphuric acid to provide the most effective use of these commodities in the national interest were announced by the Board of Trade last week, and became operative on Tuesday. The schemes are based on a consumption of approximately 100,000 tons per quarter. Broadly, it will mean that industrialists will receive supplies varying between 80% and 90% of their total consumption during 1950. No consumer should receive less than he has had since the beginning of the year and many will benefit by some increase in the rate of supplies. The Board has pointed out, however, that it will be a little time before the schemes become fully effective.

C.I.G.R.E.—Date Fixed

AS foreshadowed in our issue of January 11, the 1952 C.I.G.R.E. Convention will begin one month earlier than previous conferences. As usual the venue will be the centre Marcelin-Berthelot, in Paris, and the opening and closing dates are May 29 and June 7. The advancement has been made in the hope that the heat will be less intense at that time, and the comfort of delegates is also being cared for by arrangements for a 50% improvement in ventilation and better lighting.

Although the total number of papers to be presented is smaller than in 1950, the number of simultaneous meetings will be greater, thus complying with the wishes of the Council and of delegates. A full day has been reserved for the more important questions, that is to say alternators, insulating oils, circuit-breakers and transformers for the first section; cables, towers and overhead lines for the second; relaying, stability and surges for the third; and finally a.c. and d.c. power transmission at e.h.v. for the fourth section.

Electricians' Dispute Inquiry

THE parties concerned in the dispute of electricians employed in the contracting departments of the London, Eastern and Southern Electricity Boards (some 2,000 of whom were on strike for about eight weeks), have been recommended to get together for talks, by the chairman of the Court of Inquiry which completed its hearing into the dispute last Friday. In the course of the hearing, Mr. F. Foulkes, president of the Electrical Trades' Union, submitted that the background to the widespread character of the dispute was the failure of the B.E.A. and the Area Boards to conclude a mutually acceptable agreement with the union for the members employed by the Boards in the contracting industry. He opposed the contention of the L.E.B. that the dispute at Bethnal Green fell to be determined by the N.J.I.C. for the electricity supply industry, and claimed that the E.T.U. was the only organisation with negotiating rights for the men concerned. After Mr. E. W. Bussey, labour relations member of the B.E.A. had pointed out that the dispute was a matter only for the unions concerned, Mr. J. Tiffin, representing the T. and G.W.U., asserted that the E.T.U. wrongly attempted to compel the mate originally concerned to transfer to the E.T.U. Avenues were open for a settlement round the table, which would have averted the strike, he maintained. During the hearing, an employee of the L.E.B. applied in the Chancery Division, on behalf of seven other members of the E.T.U., for an injunction restraining union officials from taking any disciplinary action against them. On the union giving an undertaking, the motion was adjourned till May 10.

Right or Wrong?

THE Minister of Fuel and Power has declined to modify the tariff adjustments made by the Eastern Electricity Board and introduced in the area on January 15. Strong protests, both written and oral have been made by the Area's Consultative Council since details of the increases were known last year, but at tomorrow's (Friday) meeting the secretary will inform the council of the Minister's reply to its representations. The letter states that while in July 1950 the council may not have been wrong in the view it took of its duty towards consumers, subsequent events have fully justified the tariff increases.

The council objected to the immediate enforcement of the tariff adjustments and representations were made accordingly to the B.E.A. These were rejected as also was the suggestion that the Authority should receive a deputation. Following this the matter was taken up with the Minister himself, who saw a delegation on April 5, with the above result.

The First Half-Century

The Board of Trade, after consideration of the representations made at the recent inquiry held at the Westminster Town Hall with respect to the Regulations made by them under the Electric Lighting Acts, 1882 and 1888, for ensuring a proper and sufficient supply of electrical energy, have decided to make further Regulations amending those previously made.—*From our issue of May 2, 1901.*

The Millionth Consumer

AN important milestone in the hitherto short history of the Southern Electricity Board was passed last month when the Board connected its millionth consumer. To mark the occasion it has been decided to present this distinguished customer with an immersion heater installation which will be switched on by Mr. H. Nimmo, chairman of the Board, on Thursday next.

E.A.W. opposes Tax Decision

STRONG representations are being made to the Chancellor of the Exchequer by E.A.W. for remission of the additional purchase tax imposed on washing machines and vacuum cleaners. While welcoming the Chancellor's attitude towards lightening the housewive's burden by removing taxes on a number of household articles, the Association was surprised at the increase on two of the most labour-saving appliances. It maintains that the two decisions are contradictory and the request is being made more particularly in view of the need for women to give some of their time to public life and industry. The Association's 114 branches will also approach their respective M.P.s in the same vein.

Training of Apprentices in Scotland

A TRADE union claim that each apprenticeship arranged by members of the Electrical Contractors' Association of Scotland should provide for compulsory attendance of the apprentice at a technical course up to the age of 18, has not been upheld by the National Arbitration Tribunal. But the Tribunal recommends that the Association and the E.T.U. should ask the appropriate authorities to increase the facilities available for day training of apprentices as soon as possible. The Association had contended that it would be several years before accommodation for day training on a national basis could be provided, and it was impracticable in the existing economic conditions to press local authorities or the Government to provide them.

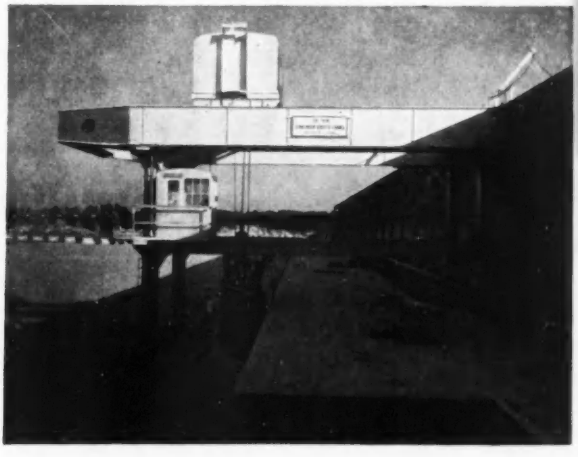
Electrified Fences for Farms

A GREAT deal of information on the use, application and precautions necessary with electrified fencing for farm animals is to be found in "Electric Fencing" Bulletin No. 147 of the Ministry of Agriculture and Fisheries, now available from H.M. Stationery Office at one shilling. In addition to describing the equipment available and its applications, the booklet deals with erection and maintenance, and reference is also made to the legal aspect and relevant B.S. specification.

Technical Training in R.N.

PRINCIPAL speaker and guest at the Batti-Wallahs luncheon on April 25 was Rear-Admiral C. F. W. Norris, D.S.O., who had some pertinent words to say on the present-day problems of technical training with the Royal Navy. He emphasised the fact that the primary object of executive officers' training was still that they should be leaders of men, but modern technological developments had made it essential that they should have a basic appreciation and knowledge of the equipment they controlled. Specialist officers and men also had to be available to deal with this equipment in detail. For these reasons it was essential that a large proportion of officers and men should be long-service, as short-service personnel did not have the time to assimilate the requisite knowledge.

To a certain extent the Navy was in an advantageous position as far as the other Services were concerned, as realistic training was possible in the expanses of the ocean. Dealing with the National Service intake, he mentioned that few people came into the Service directly, the majority having been in the R.N.V.R. He could not speak



A new device on the 25-ton electric gantry crane supplied by the Dominion Bridge Co. to the Hydro-Electric Power Commission of Ontario, and put into use for the first time at the Chenaux development, is expected to reduce some of the hazardous work carried out on the dam. As may be seen from the photograph trash rack sections and gate logs are lifted by a follower which hangs on the main hook and is provided with hooks or latches each end. Hitherto a man had to go with the crane to retrieve the rope operating those hooks. The new feature comprises a torque motor drive which keeps a light tension on the rope and automatically retrieves it

too highly of the excellent calibre of these men. The Navy was able to offer excellent promotion opportunities and provide specialist courses for those who attained commissioned rank and sub-specialist courses of non-commissioned ranks.

Technological Education

FOLLOWING the presentation, by the president of the Institute of Fuel, Mr. J. F. Ronca, of the Melchett Medal to Prof. F. H. Garner, Sir Frederick Handley Page spoke with considerable force on the future of technological education in this country. He emphasised the fact that if Great Britain were to climb out of the present situation it was essential to have a requisite number of technologists. In Denmark, the universities were passing out seven technologists for each academically-trained graduate. In this country, the equivalent figure was 0·45. It had been suggested that a Royal College of Technologists should be established. He thought this was too all-embracing. There were in existence some six or ten colleges of university or near-university status which could be up-graded to full university status for technological education. The output from these colleges should be capable of taking over the reins of business. He advised all present at the luncheon to consider seriously the implications of technical education.

Tiger in Mount Street

A FINE piece of glass craftsmanship now confronts the visitor to 103 Mount Street, W.1, where the new showrooms of Fothergill and Harvey Ltd. were opened recently. This glasswork represents a tiger's head which coupled with the name, "Tyga" forms the company's trade mark. As pointed out by Mr. Charles Harvey, chairman, in his welcoming speech, the company believes that the future of the textile industry lies with the development of synthetic materials into new, more durable and less expensive, fabrics. Among new developments in this field are "Tygan" and "Tyglas." The former is a woven monofilament cloth in plastic, whilst under the trade name "Tyglas" a woven glass fabric is now an established feature of the manufacture of plastic laminations and in electrical insulation.

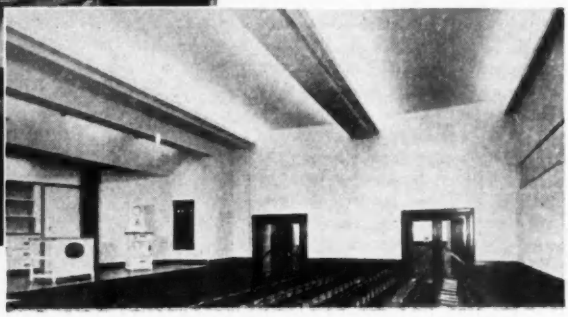
The new showrooms were designed by Frank R. Wray, M.B.E., F.I.B.D. Decorations and furnishings are carried out in such a way that they do not detract from the true beauty of the fabrics displayed.

Hot and Cold Cathode Lighting

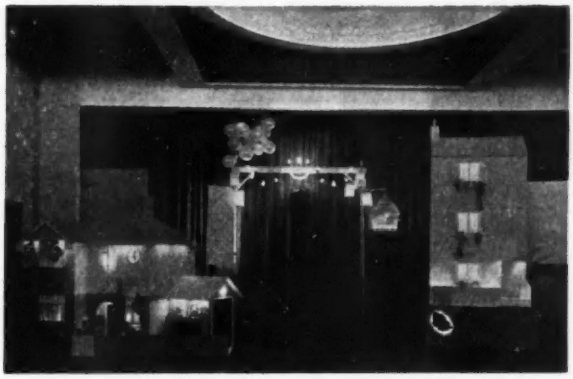
AMONG recent lighting installations which have attracted our attention are the hot cathode dimming scheme inaugurated in the demonstration theatre at the new Bristol premises of the S.W. Electricity Board, and cold cathode system in a British Railways restaurant car. The apparatus at Bristol, designed and supplied by G.E.C., is believed to be the first commercial example of a dimming installation for hot cathode fluorescent lamps, although similar equipment was used in the chamber of the new House of Commons.

Dimming control has been applied to the lamps in four special twin-lamp fittings on the stage and to one row of lamps in each of the twin rows concealed in the cornices above the auditorium. A total of 35 lamps are controlled in this way. Power factor correction has been provided centrally by banks of capacitors, so that the dimmer unit associated with each lamp comprises a choke, filament heating transformer and transductor. In addition to the fluorescent lighting there are four 150 W spotlights in the auditorium and five on the stage.

Another G.E.C. installation concerns a first-class restaurant car which went into service on the St. Pancras-Derby run last week. It marked the completion of research



Left is shown the effect gained by the adaptation of cold cathode lighting for railway coaches, and below is the hot cathode installation inaugurated at the Bristol centre of S.W.E.B.



Examples of E.L.M.A.'s suggestions for brighter homesteads (see p. 764)

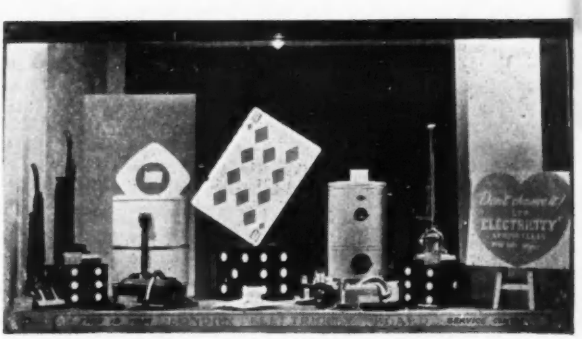
into the development of cold cathode lighting suitable for coaches with standard British 24 V d.c. system. In such circumstances colour rendering in respect of food and drink is an important factor and cold cathode meets the demand admirably, but added advantage is the longer life of these lamps. The tubes are mounted in a continuous triple row in the centre of the ceiling, outer tubes being warm white and the centre, gold in colour.

High-speed Trams in Leeds

AS an alternative to converting more tram routes to buses, Leeds is to experiment with high-speed, 40 ft long, single-deck trams, and an order for electrical equipment for the first of these has been placed with Metropolitan-Vickers Co., Ltd. The equipment will include motors and gears on noise- and vibration-proof mountings with automatic acceleration and braking equipment. The new trams will run on tracks not normally crossed by other vehicles, and we understand that if experiments prove to be successful, what will virtually be a light railway system to and from the suburbs is to be built.

"Don't Chance it" Display Wins

IDEAS are the life blood of all concerned with advertising and display, so that it may not be surprising to find ingenuity in shop windows, particularly if they have been entered in a competition. Results were announced last week of the London Electricity Board's competition in which the set theme was Spring Cleaning by Electricity, and a bright idea backed by commendable presentation was to be found at the Edgware Road service centre.



Winning display in the L.E.B.'s spring-cleaning competition which was to be found at the Edgware Rd. Service Centre

With the slogan "Don't chance it, let electricity spring clean for you always" the display featured a huge playing card, roulette wheel and cardboard dice as a background to spring-cleaning aids. Though other centres entered praiseworthy shows, the Edgware Road showroom ran out worthy winners and will thus hold the Challenge Shield until the next contest. Second and third were the showrooms at Highams Park and Islington where the respective display motifs were spring flowers and a cardboard hive with some busy bees.

Apart from the stipulated theme, other conditions of entry were that the cost of each display should not exceed £10, including labour, materials and hire of models, and that the use of manufacturer's display aids should be prohibited. There were 62 contestants in all—or nearly all the Board's service centres.

"Bonaventure"

JUDGING by the reaction of the audience, the G.E.C. Dramatic Society's production of *Bonaventure* at the Fortune Theatre last week was an even greater success than their many previous ventures. Set in a Norfolk convent, this exceedingly difficult play by its very nature, imposes considerable restraint upon the players, and the difficulties of sustaining a mounting tension while maintaining the calm unflurried mien of the sister of an Order can well be imagined. Betty Michell, who gave a talented performance in the previous production of *The Browning Version* here excelled herself as Sister Mary Bonaventure, while Moira Threlfell gave us a moving study of Sarah Carn, whose appeal against conviction for murder has failed. The remainder of the cast, Joan Brain, Evelyn Rush, Sybil Thomson, John Barker, Michael Molloy, Jean Freeman, Dudley Binnington, Norah Symonds and Florence Scantlebury, while lacking the

One of three 88,750 kVA generator transformers on its way from the factory of Hackbridge and Hewittic Co., Ltd. to Barking "C" power station. The second and third transformers are scheduled for delivery in 1952 and 1953. Each unit will step up the generator voltage of 12,500 to feed into the 132,000 V grid system and have single core 132 kV cable sealing ends for outgoing connections instead of the more usual h.v. porcelain bushings. Weight of each transformer is nearly 150 tons

opportunities presented by these two parts, maintained the high standard. The producer was William Peacock.

International Trade Club

AS the Festival is not regarded officially as a trade fair, provision of buyers' rooms was not visualised by the planners, but to offset this inadequacy a number of firms have combined to provide an International Trade Club for the entertainment of overseas business men. Among organisations interested in the project is Philips Electrical Ltd., who have taken one of the private club rooms. Amenities provided include travel, accommodation and entertainment facilities, and the services of interpreters and stenographers. The lighting incorporates the company's latest fluorescent fittings and projection television receivers have been installed in all club rooms for visitors' entertainment. The club is situated on an island site at the junction of Westminster Bridge Road and Lambeth Palace Road, 200 yards from the South Bank site.

To Brighten the Home

IT is generally agreed that the country should be brightened with light and colour during the Festival, and with this object in mind the E.L.M.A. Lighting Service Bureau have offered a variety of suggestions that the British householder could use to brighten up his home. To demonstrate their proposals the L.S.B. showed two quarter size model houses suitably decorated with strategically placed lamps (see p. 763). In a villa, for instance, light was concealed under the eaves and over flower baskets, flags and flower-beds. Window boxes lit from exterior pelmets above the windows, and walls floodlit by fluorescent lamps mounted behind Continental shutters were suggested for the small terrace house. Suitable decorations proposed for the garden were Chinese paper lanterns, and festoon lighting.

For Discussion at E.C.A. Conference

AT the Golden Jubilee Conference of the Electrical Contractors' Association at Harrogate, on May 28-30, a paper on "Storage Battery Emergency Lighting Systems," will be presented by Mr. E. R. Sanderson (of Chloride), on the morning of May 29, while in the afternoon Mr. W. T. Trace, vice-president, will deal with the national apprenticeship scheme, and Mr. L. C. Penwill, COMP.I.E.E., will deliver a paper on "Some Aspects of the Trading Structure of the Electrical Industry."

NEWS IN BRIEF

The Ministry of Supply has announced that although lead allocations for May remain unchanged, deliveries may be delayed because of temporary shipping difficulties. The Ministry expects to be able to deliver at least 80% of average monthly consumption in 1950. The balance of 10%, if it cannot be delivered in May, will be delivered in June in addition to that month's quota.

The depot of the Giant's Causeway and Bush Valley Railway, claimed to be the oldest hydro-electric railway in the world, was auctioned in Portrush recently, and bought by a Londonderry firm for £2,000.

The Leicester and East Midlands Industries Exhibition and Trade Fair will be opened on May 23 at the Granby Hall by the Duchess of Kent. It closes on June 2.

In regard to our paragraph on A.E.I. Ltd.'s brochure, which appeared on page 716 of last week's issue, the number of employees was inadvertantly given as 5,500. This should have read 55,000.

Marconi's Wireless Telegraph Co., Ltd. have produced a small pamphlet for their overseas friends outlining the part being played by the company in the Festival of Britain.

Questions in Parliament

Stand-by Plant

The Minister of Fuel was asked by Mr. G. Nabarro on Monday, what was the Government's policy regarding the encouragement of industrial undertakings to install generating equipment which was independent of mains electricity supplies, and what steps he was taking to arrange for the removal of impediments and restrictions imposed by the electricity supply authorities upon the installation of such equipment? Mr. Noel-Baker replied there were no impediments or restrictions upon the installation of independent electrical generating plant. Any industrialist or farmer was free, if he so desired, to install his own supply, and many had done so. Some firms, however, which made contracts to take their electricity from the public supply, desired also to install stand-by generating plant as a safeguard against interruptions of supply. Many of the contracts which were taken over by the B.E.A. prevented the use of this plant except during actual interruptions, since the provision of an electricity supply which was only partly or occasionally used was relatively uneconomic to the supplier. In 1947 the supply industry agreed to waive such conditions in their contracts and also reduced some of the charges. In 1948 the B.E.A. and the area boards decided to continue these concessions until March 31, 1952, and had recently decided to continue them until March 31, 1956. In view of these concessions it was hoped that industrial undertakings which had installed stand-by plant would be willing to use it regularly next winter. The B.E.A. was about to have talks with the F.B.I. on whether they could extend the concession. If a firm by installing such plant, produced more power than it needed for its own work, the B.E.A. was prepared to buy the surplus for the grid.

Scottish Highlands Development

In the course of a lengthy discussion on Scottish Highland development, initiated by Commander Galbraith, last week, he said that when the North of Scotland Hydro-Electric Development Act was placed on the Statute Book, many thought that not only would the Highlands be provided with an abundant and cheap supply of electricity, but that there would be considerable profits from the sales of electricity to the B.E.A. which would materially assist measures for the economic development and social improvement of the Highland areas. He asked what were the Board's chances in that direction, for apart from such profits, the Board had no funds available? Last year's profit of £97,000 he considered good, but that accrued to the largest extent from its own consumers. Mr. Hector McNeil, Secretary of State for Scotland, in the course of a lengthy reply, referred to a visit to John Brown's in Clydebank where he saw a closed-cycle gas turbine using peat. They were confident that by next year on a very small experimental pilot plant they would complete the process of feeding peat in at one end and running a small generating station from the process and the product at the other end. In regard to the N. Scotland Board some 37,000 new consumers had been supplied in the last three years. Later, Mr. Grimond mentioned the other experiment in electricity generation in the Highlands—using wind power—and then went on to suggest that N. of Scotland Board should be given some powers to develop industry itself, although not to the extent of the T.V.A. Lord Malcolm Douglas-Hamilton referred to the case of crofters in the Kilmorack area who, although able to get a Government grant of 50% for wiring their houses, had been asked by the Board to make a capital contribution of £10. And then Capt. Duncan again asked for the amount to be allowed to the N. of Scotland Board for capital expenditure, stressing that although the 1951-52 financial year was well advanced, the Board was not yet able to define to its area managers the amount that would be available for generation and distribution. Winding up the discussion Mr. T. Fraser, joint under-secretary of State for Scotland, replied to many of the points raised, although he could not satisfy Capt. Duncan. In regard to hydro-electric development, it was the policy and hope of the Government that the work that went in would be balanced between the supply of electricity for the Highlands and feeding into the Grid.

Washing Machines (U.K. Sales)

The President of the Board of Trade was asked if he was aware that an arrangement had been made between the Thor Corporation, Chicago, and the manufacturers of the Parnall washing machine in this country by which the latter organisation was granted a licence by the former to manufacture those machines on condition that the appliances were supplied exclusively to the B.E.A. for resale in their showrooms; and what action he proposed to take to stop this practice of monopoly distribution of a household requisite? Mr. Rhodes replied that he had no power to interfere with the arrangement. There were many makes of washing machines on the market, and he was informed that the Parnall machines represented only a small proportion of the total supply in this country.

Capital Investment

Questioned as to why the Government had fallen behind their programme for expanding generating capacity, Mr. Noel-Baker explained that the estimated rate of investment given in the 1948 White Paper resulted from an over-optimistic assessment of the speed with which the industries making generating plant could expand their capacity. Moreover, at the date of publication of that White Paper it was not possible to assess the extent of the delay resulting from the lack of co-ordinated ordering and construction work prior to nationalisation of the supply industry.

Electric Supply News

Eastern

In the month of March, the Eastern Electricity Board connected 3,707 new consumers, of whom 1,036 were in the Essex sub-area and 675 in the Chilterns sub-area. Among the connections were 72 farms. Mains extensions during the month amounted to 47 miles of l.v. and 38 miles of h.v.

Isle of Wight

Arising out of a recent accident to a vessel, the Newport Town Council (I.o.W.) has resolved that the cable over the Medina Estuary at Kingston should be placed underground, as it was a menace to shipping going to and from Newport Harbour. To this suggestion, the Southern Electricity Board has already intimated that it is unable to agree. The Council had communicated with the Ministry of Transport, who stated that consent to the erection of an o.h. cable with a clearance of 90 ft above high-water mark at ordinary spring tides, had been given in April, 1950, subject to the assurance by the Board that the clearance would be maintained with the conductors loaded with ice three-eighths of an inch thick. It was a condition of consent that the Board should increase the height of the cable if and when called upon by the Minister to do so, and they had been told that this was necessary, but the Minister wished to have the Corporation's views as to the clearance now to be provided. So the M.o.T. is to be told that the council wishes the cable to be underground.

Luton

The Town Council has denied liability to the B.E.A. for sums of £1,869 and £6,123, which were transferred in aid of rates from the electricity undertaking profits before nationalisation it was explained last week when the council were told that the B.E.A. would waive the smaller amount, but that the transfer of the £6,123 was contrary to a section of the amended Electricity Lighting (Clauses) Act of 1899. Questions were being asked when the clerk, Mr. W. H. Robinson, saying that a writ had been served on the council, advised against further discussion on the matter.

N. Ireland

Questioned last week about hydro-electric stations in Northern Ireland, Mr. M'Cleery, the Minister of Commerce, stated that the most recent investigations into the possibility of establishing hydro-electric stations on the River Bann (at Carnroe) and the River Mourne (at Sion Mills) were started in August of last year though the matter had been the subject of earlier investigations. In the case of the Mourne surveying was still in progress; a report on the potential Bann scheme had recently been received and was under consideration. The facts as disclosed by the report were such as to require the most careful consideration of the economic aspects of the project before approval could be given by the Ministry. Referring to electricity in rural areas, the Minister said that during the past year 825 farms had been connected, bringing the total up to 3,670. In addition, 3,674 rural premises had been given supplies apart from the farms already mentioned. While the figures showed a satisfactory rate of progress, the chairman of the Electricity Board was gravely concerned at the financial position in which the Board was likely to find itself by December 31 next, when the position was due to be reviewed. The returns of revenue from new connections made to rural premises in general still showed a disappointingly low level. Parliament had granted the rural population a unique concession by the abolition of guarantees and capital contribution, and it was, therefore, more than ever their duty to help the Board to keep down charges and, incidentally, to help themselves, by making the fullest use of the supply.

Pontypridd

The South Wales Electricity Board is now undertaking the change over of system in the town area from 230 V d.c. to a.c.

Westmorland

It was possible that the Ministry of Fuel and Power would hold an inquiry into proposals for supplying electricity to Waternook, Howtown and Martindale, the Westmorland County Council was told recently. The Planning Committee recalled that planning approval of the proposal had previously been given on condition that the lines were placed underground for their whole length. In respect of a similar scheme to supply Langdale, the Planning Committee has suggested that certain sections of the line should be underground. The committee decided that if the Ministry proposed to hold an inquiry relative to the Howtown and Martindale lines they be asked to deal with the Langdale application at the same inquiry if the conditions imposed were unacceptable to the Electricity Board.

Wimbledon

The proposal for the erection of a new generating station at Durnsford Road, Wimbledon, has been dropped by the B.E.A., we understand. Objections to the scheme were made both by the Surrey and London County Councils.

Yorkshire

A deputation from the Yorkshire Electricity Consultative Council is to meet officials of the British Electricity Authority in London this month to discuss the Yorkshire Electricity Board's standard domestic tariff proposals. We have reported that the Council appealed against the Board's refusal to include a proposal made by the Council in the scheme for the standardisation of domestic tariffs in Yorkshire. The Council agree that standardisation is desirable, but some members say there should be no increased charges for any consumers because the Board made £1,300,000 profit in the year ended March 31, 1950. The Council have already unsuccessfully appealed to the Board.

LIGHTING SCHEMES

Ellesmere Port.—The M.o.T. has approved the Council's scheme for lighting the main road from Childer Thornton through Little Sutton.

Darlington.—The T.C. has applied for sanction to borrow £1,210, to provide street lighting on the Haughton South site.

Maidstone.—Application is being made for consent to borrow £2,170 for modified scheme of street lighting in Tonbridge Rd.

Guildford.—The Works Committee has recommended the T.C. to approve schemes for street lighting, using 75 W mercury-vapour lamps at Bushy Hill, cost £2,467; Upfolds and Glendale Drive, cost £1,005; New Inn farm estate and police site, New Inn Lane, cost £916.

Stalybridge.—Baths and Lighting Committee has approved schemes for lighting in Clarence Street, at a cost of £1,280, and on Bucton Vale housing estate, at a cost of £1,650.

Company Activities

Allen West and Co.

Group profit for the year to January 31 last, after all charges, including taxation, amounted to £255,441, a decrease of £25,014 on the previous year's total. There is an Ordinary dividend of 12½%, as against a 7½% dividend and 2½% bonus for the preceding 12 months. Of the group profit, the proportion attributable to the holding company is £254,664 (*£279,466*). Dividends absorb £63,984 (*£53,625*) and there is £150,000 transferred to the parent company's general reserve.

Chloride Electrical Storage Co.

Net profit for 1950 is £1,117,153 as against £990,545, after deducting U.K. taxation of £1,056,912 (*£1,164,189*), and other taxation amounting to £70,919 (*£22,296*). Transfers to reserves, including depreciation, total £503,575 (*£391,085*). There is a further dividend of 10% on the "A" and "B" Ordinary shares, making 15%, payable on May 25. For 1949 there was a total of 12½%, of which an interim of 5% was paid on £1,088,703 capital and the final 7½% on the present capital as increased by the 100% scrip bonus.

A. Reyrolle & Co.

Consolidated trading profit for 1950 is £1,747,464 compared with £1,356,954 in 1949. Adding other income, the total becomes £1,815,206 (*£1,417,643*). Depreciation absorbs £65,596 (*£67,767*), directors' fees £1,600 (*same*), staff superannuation £31,841 (*£31,742*), provision for employees' benefits £20,000 (*£10,000*), taxation £915,000 (*£713,585*), leaving a net profit of £781,169 (*£587,675*). A sum of £200,000 has been added to the general reserve fund, £78,413 placed to reserve on stocks and work-in-progress, and £100,000 set aside for renewals of machinery and equipment. Also £200,000 has been allocated to development expenditure account, and £81,688 applied from that amount in writing down expenditure on the testing station and on a new heavy-current laboratory.

C. A. Parsons & Co.

The preliminary statement shows a net profit of £656,589 for 1950, after charging £748,000 (*£414,000*) for taxation and providing £50,000 (*£60,000*) for contingencies. There is a final dividend of 1s. 6d. per £1 share, making 3s. for the year (*same*).

Siemens Brothers & Co.

Three of Britain's largest electrical concerns, A.E.I., English Electric and G.E.C., are concerned in offers now being made for the purchase of 450,000 Ordinary shares in Siemens Brothers and Co., it is revealed. The shares, which represent nearly 20% of Siemen's Bros.' Ordinary capital, were taken over from a German company by the Custodians of Enemy Property during the last war. The offer was made in a somewhat vaguely worded advertisment last week, in which the Custodian of Enemy Property offered a large block of Ordinary stock in an "important electrical engineering company in this country". It is desired to sell the stock in one block. Usually, when large blocks of shares are offered the price is below market level, which, in the case of Siemens Bros., is around 36/6d. But this may not apply, in view of the standing of the potential bidders.

Laurence Scott & Electromotors

Trading profit for 1950 is £431,313 (*£381,269*). There is a dividend of 12½% (*same*) on the A and B Ordinary shares. The net profit, after charging depreciation management, pension schemes and taxation, is £134,063 (*£134,403*). The sum of £209,000 (*£162,500*) is charged to taxation, and £17,504 (*£15,000*) is provided for pensions.

Parnall (Yate) Ltd.

For the year to February 20 last, the group profit, before taxation, is £244,094 as against £242,423 for the previous year. Taxation takes £147,000 (*£138,550*). The final dividend is 5%, making 7½% (*both same*), and there is £58,941 (*£60.576*) carried forward.

Dividends Declared

Barcelona Traction, Light and Power Co.—Ordinary dividend of $1 per share, payable on June 15.

British Thermostat Co.—Final Ordinary dividend of 22½%, making 30% (*same*), group net profit is £131,366 (*£153,651*).

Burco Ltd.—Interim dividend of 10% (*same*).

Pressed Steel Co.—Final Ordinary dividend 12½% (*10%*), making 20%. Net profit is £1,023,809 (*£860,399*).

Radio Rentals.—Interim dividend of 10% (*same*) on larger capital, payable on June 1.

Telephone Manufacturing Co.—Final dividend of 7½% making 10% (*both same*).

Telephone Rentals.—Final dividend of 6% making 10% (*both same*), payable on June 18.

Commercial Information

CONTRACTS OPEN

HOME

May 4.—Galway. Electrical services at new maternity annexe of Clifden District Hospital. Engineer is N. Mathews, 42 Fitzwilliam Place, Dublin. Deposit £5 5s.

May 4.—Dunbarton. Electrical work in new clinic at Croy. Applications by above date to Ben P. Gibb, County Architect, Ferry Rd., Old Kilpatrick.

May 5.—Norton-Radstock (Som) U.D.C. Electrical works for 38 and seven houses respectively at Westfield, Radstock. W. J. Landray, Clerk, Council Offices, Midsomer Radstock.

May 7.—Newcastle-under-Lyme T.C. Supply and installation of lanterns, lamps, control gear, concrete columns and underground cables. 400 W mercury vapour lamps along approximately 2½ miles of Winchester-Preston trunk road, including about 3,000 yd of cabling; and 140 W sodium vapour lamps along ¾ mile of Bradwell Lane. Borough Engineer and Surveyor, Lancaster Building, High St. Deposit £2. (See April 26.)

May 7.—Wallasey T.C. Electrical installation in extension to Eastway School. Borough Architect, Town Hall.

May 7.—Hull. Electrical installation in 40 houses on Bilton Grange estate. City Architect's Dept., Guildhall. Deposit £1 1s.

May 8.—Cheadle and Gatley U.D.C. Supply of electrically driven air compressor L. Rogerson, Acting Engineer and Surveyor, Town Hall, Cheadle, Cheshire.

May 8.—Sutton and Cheam T.C. Electrical installation in 24 flats and eight maisonettes being built on "White House" site, High St., Cheam. N. H. Michell, Borough Engineer and Surveyor, Municipal Offices, High St., Sutton, Surrey.

May 10.—Belfast. Supply and installation of rising main trunking and ring main trunking in renewal of electrical installation at College of Technology. F. W. Parkinson and Partners, 6 Murray St., Belfast.

May 11.—Altrincham T.C. Rewiring of electrical installation at public slaughterhouses in Moss Lane. Borough Surveyor, Town Hall.

May 11.—Cavan (Eire). County Council requires supply of one heavy duty cooking unit, two electric boiling urns, an electric food slicer, an electric potato peeler, an Esse cooker, and the installation of two built-in cold rooms. Particulars from M. J. Smith, Secretary, Courthouse, Cavan.

May 11.—Sunderland. Electrical installation in Pennywell East primary junior and infants' schools. Architects, Wm. and T. R. Milburn, 17 Fawcett St., Sunderland. Deposit £2 2s.

May 12.—Manchester. Electrical installation to, alterations and additions to, and reinstatement of electric lift at, the Lancasterian special school, Didsbury. City Architect, Town Hall. Deposit £1 1s. (See April 19 issue.)

May 14.—Edinburgh. Electrical installation at Glenlockhart. City Architect's Office, City Chambers.

May 14.—Manchester. Supply of electric lamps for central Purchasing Committee. General Manager, Corporation Transport Dept., 55 Piccadilly, Manchester 1.

May 16.—Stepney. Three lifts and one ash hoist, all electrically operated, in connection with the flats being built in Vallance Rd. Borough Engineer and Surveyor, London Fruit Exchange, Duval St., Spitalfields, E.1.

May 16.—Middlewich U.D.C. Electrical wiring of 56 houses being built on Chadwick Fields estate. Engineer's Dept., Victoria Building, Middlewich. Deposit £2 2s. (Advertised in this issue.)

May 16.—Cork. Chain cutter and hollow chisel morticer, sanding machine, tenoning machine and scriber, and cutter grinder, all fitted with electric motors suitable for 380 V a.c. P. Monahan, City Manager and Town Clerk, City Hall.

May 17.—Folkestone T.C. Internal electric wiring in 36 flats on Bridge St. site and 24 on Biggins Wood site. Names should be lodged with Borough Engineer, Municipal Offices, West Terrace, Folkestone, by May 1. Deposit £1 1s. for each.

May 18.—St. Albans (Herts) R.D.C. Provision and installation of 31 sodium vapour lighting units in High St., Redbourn, including supply and erection of concrete columns, lanterns, auxiliary equipment and wiring. Surveyor, C. Huskinson, 43 Upper Lattimore Rd., St. Albans.

May 18.—Ashton-in-Makerfield U.D.C. Supply and erection of 100 concrete columns and 100 lanterns, lamps, auxiliary gear and wiring for Class A street lighting on trunk road A.49. Surveyor, Town Hall.

May 21.—Cuckfield U.D.C. Installation of electric lighting and power circuits in 74 houses at Haywards Heath and Cuckfield. Housing Manager, Council Offices, "Maxwelton," Boltro Rd., Haywards Heath.

May 21.—Southport T.C. Electrical work at No. 69 Albert Rd. Borough Architect and Town Planning Officer, Pavilion Buildings, Lord St.

May 23.—Southampton T.C. Electrical installation at technical college. Applications to Borough Architect, Civic Centre, by May 7. Deposit £5. (Advertised in this issue.)

May 24.—Longbenton U.D.C. Electrical installations in dwellings under the following four contracts: 48 houses at Forest Hall; 23 houses on Fordley Estate; 14 old persons' homes and recreation room at Burradon; and 7 houses at Forest Hall. R. E. Sweetman, Engineer and Surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne. Deposit £2 2s.

May 25.—Belfast. Supply and erection of 33 kV 1,500 MVA open type indoor switchgear of the airblast or small oil volume type. Merz and McLellan, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. (See April 12 issue.)

May 25.—Belfast. Supply and erection of carbon dioxide fire extinguishing equipment for electrical substations. Also of 6,600 V compound filled armour clad switchgear of 250 MVA capacity, during period from July 1 to March 31, 1952. Electricity Dept., East Bridge St. Deposit in respect of first mentioned, £2 2s. (Advertised in this issue.)

May 26.—Swansea T.C. Electrical installation in 44 houses at Penlan. Applications by above date to Borough Architect, The Guildhall. Deposit £2 2s. (Advertised in this issue.)

May 28.—Metropolitan Water Board. Supply and erection of two self-cleansing electrically driven rotary screens at Chingford (Essex) pumping station. Chief Engineer to Board, New River Head, Rosebery Av., E.C.1. Deposit £1 1s.

May 30.—Cork. Supply and installation of vehicle-actuated traffic signals at junctions of Grand Parade and Washington St., Main St., and Washington St., and Langford Row and Infirmary Rd. Tenders to P. Monahan, City Manager and Town Clerk, City Hall.

June 4.—Durham. Supply of sundry laboratory and workshop machinery and equipment for Stockton-on-Tees technical college, including electrical engineering motors, generators, transformers and instruments, electricians' tools and equipment and electric welding equipment. Applications to A. A. Denholm, Director of Education, Shire Hall, Durham.

June 9.—Leeds. Manufacture, supply and erection of following equipment for pumping station at Knostrop sewage works: one 6·6 kV, 400 A, 150 MVA switchboard; one 2 kV, 400 A, 50 MVA switchboard; one ·415/·346 kV, 2,000 A, 25 MVA switchboard; two 1,000 kVA, 6·6/2·0 kV transformers and two 500 kVA, 6·6/·415/·346 kVA transformers. Sewerage Engineer's Office, Civic Hall, Leeds 1. Deposit £5.

June 25.—Coventry. Electrical installation at Whitley Abbey E.S.N. school. Applications to W. L. Chinn, Director of Education, Education Offices, The Council House, Coventry, by May 31. Deposit £2 2s.

No date stated.—Aberdeen. Electrical work in erection of a nursery and infants' school at Northfield and a special school at Raeden. J. A. O. Allan, Ross and Allan, Architects, 10 Bon-Accord Sq., Aberdeen.

No date stated.—Midlothian. Electrical work in four houses at West Calder. County Architect, 32 Palmerston Place, Edinburgh 12.

No date stated.—Buckie (Banff). Electrical work in erection of police station. Applications to W. R. Wark, County Architect, 13 Cluny Sq., Buckie.

No date stated.—Guildford T.C. Electrical installation to 156 houses at Bushey Hill, Merrow. Borough Engineer and Surveyor, Municipal Offices, High St.

OVERSEAS

Details of items marked • may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.

May 31.—British E. Africa. Municipal Board of Mombasa invites tenders for private automatic branch exchange to work into an automatic exchange. Switching equipment to be fully tropicalised. Town Clerk, Municipal Offices, Mombasa.

Aug. 23.—Portuguese W. Africa. Supply and erection of following equipment for Biopio hydro-electric station: 4 vertical shaft water turbines of 5,200 h.p.; four 4,500 kVA vertical shaft alternators; four 6/60 kV transformers of 4,400-4,500 kW; a 6 kV indoor and a 60 kV outdoor switchboard; a 100 kVA transformer; a 75-80 kVA transformer, emergency generating unit for auxiliary services of dam; two travelling cranes and all electrical and mechanical connections, tubing etc., and aerial transmission line from dam to transformer. Director General of Colonial Development, Lisbon. B.o.T. (Ref. CRE (IB) 58995/51).•

CONTRACTS PLACED

Boldon (Durham) U.D.C. Street lighting installation at Boldon Colliery, Revo Electric Co., £3,996; electrical services, N.E. Electricity Board, £3,787.

Castle Ward (Northumberland) R.D.C. Installation of electric light and power in 108 houses at Hazlerigg, J. B. Wilson.

Cheltenham T.C. Electrical installation in 70 houses on Hesters Way estate, Midlands Electricity Board, £2,195.

Glasgow. Supply of trolley bus overhead line equipments for Clarkston-Garscube Rd. route, Clough Smith and Co. Ltd., £64,085. Also installation of three electric lifts in multi-storey flats to be built at Crathie Drive, Waygood-Otis Ltd., £11,039.

Hebburn-on-Tyne U.D.C. Street lighting on Hartleyburn estate, N.E. Electricity Board, £1,101.

Metropolitan Water Board. Manufacture, supply and erection of 11 kV and 415 V switchgear and motor control desks for pumping station at Chingford South Reservoir, Brush Electrical Engineering Co. Ltd., £4,924; also manufacture, supply and erection of six transformers for same, Bryce Electric Construction Co. Ltd., £2,854.

Grimsby T.C. Electrical installation at Chelmsford Ave., secondary modern school, N. G. Bailey and Co. Ltd., £9,540.

Your Queries — Answered

"Stella" immersion heaters, makers of? T.E.—We presume this reader refers to "Stellex" by C. H. Blackburn & Co. Ltd., 10 Gray's Inn Rd., W.C.1. (20056)

"E.S.A." coffee percolators and elements, makers of? J. B. and T. B.—E.S.A. (Yew Tree) Ltd., 43 Yew Tree Rd., Yardley, Birmingham 25. (20065)

"Patrician" mixing machines, suppliers of? B.D.—Precision Sales Organisation, 30 Seville Rd., Worthing. (20072)

Brightglow Ltd., address of? S.E.—The original firm of Brightglow Ltd. went out of business but there is a new company, Brightglow (Cardiff) Ltd., Penarth Rd., Cardiff, operating with the same directors. (20087)

"Neata" fusegear, makers of? W.C.—General Electric Co Ltd., Magnet House, Kingsway, W.C.2. (20092)

"Master Cook" table cooker, makers of? C.A.—Warnford Constructions Ltd., 1 Chesterfield St., W.1. (20098)

"R.C." soldering irons, makers of? M.I.—Electromico Mfg. Co., 18a Boxmoor St., W.11. (20114)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

"Fit-All" universal pencil type element (Patent No. 564768), suppliers of? J.M. (20119).

TRADE NOTES

New Branch. Walsall Conduits Ltd. announce that to improve their services in the Potteries, a branch is being opened at Robson Street, Hanley, Stoke-on-Trent, this week. The branch is under the direction of the Birmingham and district manager, Mr. J. F. Chaplin.

Agencies. Newman Industries, Ltd. of Yate, Bristol, have been appointed sole selling agents for the United Kingdom for HEID centre lathes and copying lathes.

Insley (London) Ltd. 119 Oxford St., W.1, have been appointed sole distributors for Hydrel needle bearings, manufactured by Hydrel AG., Remanshorn, Switzerland. The company have also obtained the agency for KFA Kugellager-Fabrik Arbon AG., another Swiss manufacturer of ball and roller bearings, taper and needle roller bearings, rollers and super-precision bearings.

Change of Name. The title of Mullard Electronic Products Ltd. has been changed to "Mullard Ltd." The new name has been adopted in order to associate the Company more closely with its trade mark "Mullard".

Change of Address. Voice and Vision Ltd. have moved to 1 Old Burlington St., W.1. Tel. Regent 3523.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	210 0 0	£196 0 0
Delivered in 2nd and 3rd month after order ...	213 10 0	—
Delivered in 4th, 5th and 6th month after order	225 0 0	—
LEAD, good soft pig (foreign)	160 0 0	136 0 0
" " " "English" quality	161 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) ... ...(Cash)	1195-1200	—
" (3 months)	1190-1195	—
ALUMINIUM, commercial purity (del.) ...	124 0 0	—
ZINC	160 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	47 10 0	—
Mild Steel Tape (0.04 in.)	26 10 0	—

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Refrigerator Facilities Ltd., Corporation St., Preston, Lancs. Electricians, electrical, mechanical and general engineers, and manufacturers of and dealers in refrigerators, etc. Cap.: £5,000. Dirs.: E. Bradshaw and W. Foxcroft.

Calmic Engineering Co. Ltd., Crewe Hall, Crewe, Cheshire. Iron founders, mechanical and electrical engineers and manufacturers of agricultural implements and other machinery, etc. Cap.: £10,000. Dirs.: F. Dunkerley, H. Ward and A. Lloyd.

Electric "O" Appliances Ltd., 186 Victoria Rd., Scarborough. To take over the business of distributors and salesmen of electrical appliances carried on at 186 Victoris Rd., Scarborough, and 76 Grange Rd. West, Middlesbrough, as "Electric 'O' Appliances." Cap.: £2,000. Dirs.: G. Smith and H. Smith.

Francis Sinclair Ltd., 20 Waterdale, Doncaster, Yorks. Electrical contractors, etc. Cap.: £3,000. Dirs.: F. R. N. Sinclair and Edna M. Sinclair.

Minny Lamps Ltd., 111a Westbourne Grove, W.2. Electricians, mechanical engineers and manufacturers and workers of and dealers in electrical apparatus and goods, including lamp shades, etc. Cap.: £1,000. Dirs.: J. Gitkin, A. Vareta and C. Gordon.

Gilbert and Thomas Ltd., 20a Greyfriars, Stafford. Engineers, general electrical installation contractors, etc. Cap.: £500. Dirs.: V. F. Gilbert, A. J. Thomas and T. E. Newell.

Gretton Ward and Co. Ltd., Gretton House, Forest Hill Rd., S.E.23. Electrical and mechanical engineers, etc. Cap.: £10,000. Dirs.: M. J. Ward, W. R. C. Ward, F. E. Ward and S. F. Ward.

Commutators Ltd., Commutator Works, Lombard Rd., Morden Rd., S. Wimbledon, S.W.19. Manufacturers of electrical apparatus, electrical engineers, etc. Cap.: £100. Dirs.: To be appointed by the subs. Subs.: M. Rokach, W. E. Arnold and W. M. Hume.

Stevens (Electrical), Ltd., Walkden Bldgs., Stockwell Gate, Mansfield, Notts. Manufacturers of and dealers in electrical goods, etc. Cap.: £2,000. Dirs.: A. E. Stevens, F. H. Wakefield and H. G. Dovey.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Bonham Electric and Engineering Co. Ltd. Meeting of members is to be held at 28 Mosley St., Newcastle-on-Tyne, on June 1 at 12 noon to receive liquidator's report.

Electrical Services (Cowley) Ltd. Meeting of creditors will be held at 8 King Edward St., Oxford, on May 8 at 11.30 a.m.

Winding-up Order

London. Auto-Cold Refrigeration Ltd., of Norbury, S.W.16. Date of order, April 23.

Appointment of Liquidator

London. Electromatic Bar Installations Ltd. Liquidator is Arthur Tyldesley Eaves, 47 Mosley St., Manchester 2, with committee of inspection.

Release of Liquidators

London. Claybury Electrical Supplies Ltd., electrical engineers of Ilford, Essex. Liquidator was Carl Fine, 14-18 High Holborn, W.C.1.

London. F. G. Blogg and Co. Ltd., Bedford Row, W.C.1, radio and electrical engineers. Liquidator was Norman Gurney Randall, 19-20 Grosvenor Place, S.W.1.

BANKRUPTCY ACTS

Release of Trustees

Haverfordwest. John William Gatenby, electrician trading at 7 High St., Haverfordwest. Trustee was Reginald Betts, Official Receiver, 4 Queen St., Carmarthen.

London. A. A. Lumelin, electrical contractor trading as "Star Electrical Service" of Cranley Mews, S. Kensington, S.W.5. Trustee was Charles L. Walker, C.A., 2-3 Duke St., St. James's, S.W.1.

Dividends

Brighton and Lewes. Albert M. Willmore, electrical and radio engineer trading at 45 King St., Brighton. Supplemental dividends of 17s. 10d. in £ payable at Official Receiver Office, 8 Old Steine, Brighton, on May 8.

BUSINESS PROSPECTS

HOME

Aberayron R.D.C. Construction of 36 houses on various sites. Council's Architects, J. Owen Parry and Lewis, Ammanford.

Ashington. Newcastle-on-Tyne Regional Hospital Board propose to carry out extensions to Ashington General Hospital and former Isolation Hospital to cost £180,000. Board's chief architect is P. H. Knighton.

Barnard Castle. N.E. Housing Assoc., Metrovick House, Northumberland Rd., Newcastle-on-Tyne, is to build 39 houses in Victoria Rd.

Basildon Development Corporation are inviting tenders for erection of 112 houses near Pitsea, Essex. Chief Architect, Gifford House, Pitsea.

Brighton. Junior school is to be built at the Grange site. Also, Council expected to invite tenders shortly for erection of 86 houses on N. Brighton estate and nine in Hereford St.

Bristow (Hereford). Cadbury Bros. Ltd., have purchased a portion of Wye Lea estate for erection of a factory.

Bromley T.C. Erection of block of 18 flats at Longfield. Borough Engineer, Municipal Offices.

Burton-on-Trent T.C. A lift, estimated to cost £2,000, is to be installed at public library.

Chelmsford T.C. Erection of 29 flats and eight shops on Springfield estate. Borough Engineer, Surveyor and Architect, Municipal Offices, Duke Street.

Chester T.C. Repair and adaptation of old Industrial School includes rewiring and supply of electrical fittings.

Chippenham T.C. It is proposed to erect 28 houses on Pew Hill site.

Clitheroe T.C. Erection of three blocks of six dwellings, a block of seven bungalows and four dwellings on site at Low Moor. Borough Surveyor, Town Hall.

Dudley T.C. approved erection of 50 houses on Brewery Fields estate.

East Sussex. Erection of Hove West Blatchington county junior school. Names to J. Catchpole, County Architect, County Hall, Lewes.

Ennis (Eire). A new school is to be built at St. Flannan's College. John C. Thompson, Architect and Engineer, 65 O'Connell St., Limerick.

Felixstowe U.D.C. Erection of a block of 4 houses and of 20 bungalows in Vicarage Rd., Thorn Way and Oak Close.

Glendale R.D.C. Council is to erect new offices and G.P.O. is to provide new telephone exchange at Main Rd., Wooler.

Goole T.C. Plans approved for redevelopment of Alexandra St. area, providing for construction of 72 dwellings—three blocks of 12 and two of 18 dwellings.

Halstead (Essex) U.D.C. Erection of 10 houses on Park Fields estate, and two blocks of flats and a terrace of houses in Parsonage St. Architect, A. E. Wiseman, 10 Duke St., Chelmsford.

Hartlepool T.C. It has been proposed that blocks of flats should be erected within borough. Also R. Bailey of Yarm-on-Tees has submitted proposal to build a cinema at West View.

Hayes and Harlington U.D.C. Erection of 46 houses in pairs and blocks of six on Bourne Farm estate. Engineer and Surveyor to Council, Town Hall, Hayes, Middlesex.

Hertfordshire. Co. E.C. has approved erection of following schools: secondary modern at Watford, grammar at Rickmansworth, junior and infants' at Oxhey, and at Boreham Wood, and secondary technical at Hatfield.

Longridge U.D.C. Construction of 24 houses on St. Wilfrid's site. Applications to Clerk of Council, Council Offices, Longridge, Preston.

Neyland (Pemb.). £50,000 is to be spent on construction of workshops as first instalment of a county college.

Northumberland. Contract to be let for installation of electric lighting at county library headquarters at The Willows, Morpeth. County Architect's Dept., County Hall, Newcastle.

Shoreditch. Scheme approved for erection of 94 flats and 10 maisonettes on Whitmore estate extension. Estimated total cost is £217,400.

South Shields T.C. Sanction received to borrow £11,153 for electrical rewiring of schools. It has been agreed to spend £70,000 in erection of new factories for three firms whose present premises will be pulled down under a development scheme. It is proposed to build a block of 14 flats in Lawe Rd. Borough Engineer is John Reid.

Stretford T.C. It is proposed to build 114 houses, 58 flats, eight bungalows and six shops on Moss Park Rd. Also 20 flats in three blocks on Sandy Lane site.

Stretford T.C. Reconstruction and extension of central library in King St. Howard and Benson, C.A.s, 88 Mosley St., Manchester 2.

Wiltshire. Additional classrooms to be built at Lowbourne school, Melksham. Applications to F. I. Bowden, County Architect, County Hall, Trowbridge.

Wisbech. Plans have been submitted for a college of further education and technical institute. Estimated cost, £267,375.

Wolverton U.D.C. Construction of 32 houses on Stacey Hill estate. Borough Engineer and Surveyor, Market Sq., Stony Stratford, Wolverton.

OVERSEAS

Canada. Cardinal Traders Ltd., 283 Kendall Ave., Eastview, Ontario, want to obtain agency for small electric washing machines.

Columbia. Dr. Francisco Sintes, technical director of Central Azucarero del Valle, S/A. Ingenio Providencia, Palmira (V) Republic of Columbia, wants to obtain literature and price lists from U.K. manufacturers of (among other things) diesel engines and generators, electric motors, air compressors and vacuum pumps, centrifugal and rotary pumps.

Iraq. S. M. Nagwe, "Engineers," Najef, Iraq, are seeking contacts with U.K. manufacturers of various equipment, including diesel engines, generating and pumping sets.

Portuguese India. Menezes and Cia., Rua D. Joao De Castro, Nova-Goa, Portuguese India, would like to obtain U.K. agencies for various items, including radios and clocks (clockwork or electric not stated).

S. Rhodesia. Ellison's Electrical Engineers Ltd., 80 Sinoia St., Salisbury, who have made plans for erection of a new factory on the town's industrial site, would like to contact U.K. manufacturers who are contemplating the assembly of their products in S. Rhodesia.

MEETINGS TO NOTE

THURSDAY, MAY 3

I.E.E. (London Utilisation Section).—"New Power Stroboscope for High-Speed Flash Photography." W. D. Chesterman, D. R. Gregg, G. T. Peck, and A. J. Meadowcroft. Savoy Place, 5.30 p.m.

FRIDAY, MAY 4

EXHIBITION OF SCIENCE at Science Museum, South Kensington, 5.30 p.m. Open until Sept. 30.

SATURDAY, MAY 5

I.E.E. (N. Midland Students Section).—Annual meeting at Griffin Hotel, Boar Lane, Leeds, 2.30 p.m.

MONDAY, MAY 7

I.E.E. (S. Midland Centre).—"Application of Gas-turbine Technique to Steam Power." J. F. Field. Joint meeting with Inst. of Mechanical Engrs. James Watt Memorial Inst., Gt. Charles St., Birmingham, 6 p.m.

A.S.E.E. (Leeds Branch).—"Engineering Insurance." Gt. Northern Hotel, Wellington St., 7.30 p.m.

TUESDAY, MAY 8

I.E.S. (London).—Annual meeting at Lighting Service Bureau, Savoy Hill, followed by an address, 6 p.m.

I.E.S.—"Luminescence." Prof. E. N. da C. Andrade. Royal Instn., Albemarle St., 6 p.m.

I.E.E. (N. Midland Centre).—Annual meeting. "Mind and Invention." Prof. G. P. Meredith. Queen's Hotel, Leeds.

I.E.E. (N.W. Centre).—"Development of the Electrical System on the Bristol Brabazon." M. J. J. Cronin. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (N. Ireland Centre).—"Impressions of the 1950 session of Paris High-tension Conference." W. Szwander. Also annual meeting. Queen's University, Belfast, 6.45 p.m.

I.E.E. (London Students Section).—"Television—Generation and Transmission of Signals." I. J. Shelley. Golden Fleece, Chelmsford, 7 p.m.

INSTN. OF ELECTRONICS (Midlands Branch).—"Recent Applications of Electronic Techniques in Industry." R. J. F. Howard. Imperial Hotel, Temple St., Birmingham, 7 p.m.

A.S.E.E. (Bolton Branch).—"Approach to Electronics in their Application to Industry." F. E. Noakes. York Cafe, Gt. Moor St., 7.15 p.m.

WEDNESDAY, MAY 9

I.E.E. (London Radio Section).—Symposium of papers on the Sutton Coldfield Television Station given by P. A. T. Bevan, H. Page, E. A. Nind, E. McP. Leyton, and E. C. Corle. Savoy Place, 5.30 p.m.

I.E.E. (S.W. Sub-centre).—"Testing, Reconditioning and Servicing of Domestic Appliances." Faraday Hall, St. Austell, 3 p.m.

NORTHAMPTON ELEC. ASSOC.—"Electrical Contraptions by the Committee," followed by annual meeting. 7 p.m.

A.S.E.E. (Birmingham Branch).—"Centrifugal Pumps." Chamber of Commerce, New St., 7 p.m.

A.S.E.E. (Bradford Branch).—"Protection of Overhead Lines against bad Weather." F. Lister. Midland Hotel, 7.30 p.m.

THURSDAY, MAY 10

I.E.S. (Leicester Centre).—Annual meeting at E.M.E.B., Charles St., 6.30 p.m.

FRIDAY, MAY 11

A.S.E.E. (Crewe Branch).—"Motors and Control Gear." Crewe Arms Hotel, 7.30 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Ellison. B692,518. Class 11. Flame-proof lighting fittings for use in collieries and other places where explosive conditions exist. George Ellison Ltd., Wellshead Lane Works, Perry Barr, Birmingham 22.

Pandomatic. 691,230. Class 6. Mechanisms operated by electric motors for raising and lowering motor car hoods for opening and closing windows and skylights and for use as parts of machines in the automatic operation of manufacturing processes. P. and D. Motor Development Co. Ltd., 139, High St., W.8.

Velodyne. 696,339. **Velodynamic.** 696,340. Class 9. Microphones. Lustraphone Ltd. 84, Belsize Lane, N.W.3.

THE RHEOSTATIC COMPANY

Larger Turnover and Increased Profit

THE fourteenth annual general meeting of The Rheostatic Company, Limited, was held on April 26 at Slough.

Mr. M. J. Gartside, B.SC.(Eng.), A.M.I.E.E., M.Amer.Soc.H. V.E., Chairman of the Company, in the course of his speech, said: A year ago I referred to the rising demand for your Company's products at home and overseas, and from the accounts and report in your hands you will see that the resulting larger turnover has provided increased profit compared with the previous year. The net profit amounted to £31,308, after providing £38,688 for taxation. The board have increased the general reserve by £14,535 to £60,000 and recommend a final dividend of 12½%, making 16¼% for the year.

Your Company now has a greater volume of orders for temperature controls than ever before in its history, and although output of the Slough and Frimley Works has been expanded considerably it is still insufficient to meet current demands and deliveries are consequently lengthening.

As a result of the excellent work of the Company's development departments, the products now manufactured cover a wider range of applications than previously. Apart from the domestic markets of electric water heating and cooking, in which your Company maintains its paramount position, a larger proportion of the total output is now spread among the important fields of central heating, air conditioning, gas firing, coal stoking and oil burning.

The original business of the Company, the manufacture of unbreakable resistors, is steadily maintained, and a new design of resistor particularly suited to electric traction applications is attracting great interest at home and abroad.

Orders received from overseas and the corresponding export sales have attained record figures and their value continues to rise.

The consolidated accounts presented to you indicate that the profits earned by your subsidiary companies in France and South Africa are more than double those of the previous year. Subsidiary and associated companies have not only provided useful revenue by way of dividends and royalties on local manufacture, but have enabled the companies' position to be strengthened in their respective fields, and have brought substantial export orders to the parent company for the many instruments not locally manufactured.

I know that shareholders would like some indication of the future trend of the business. It is impossible to make any forecast in the present unsettled conditions, but, half-way through the current financial year, I can say that your Company has so far earned profits at a rate which would be adequate to maintain the present standard of dividend despite the burden of the increased tax on distributed profits.

The further extensions of buildings and plant which are necessary to meet the growing turnover of the Company will require additional finance in the near future. The report was adopted.

Messrs.

TROUGHTON & YOUNG LTD.

Electrical Engineers, Knightsbridge, London, S.W.3

used

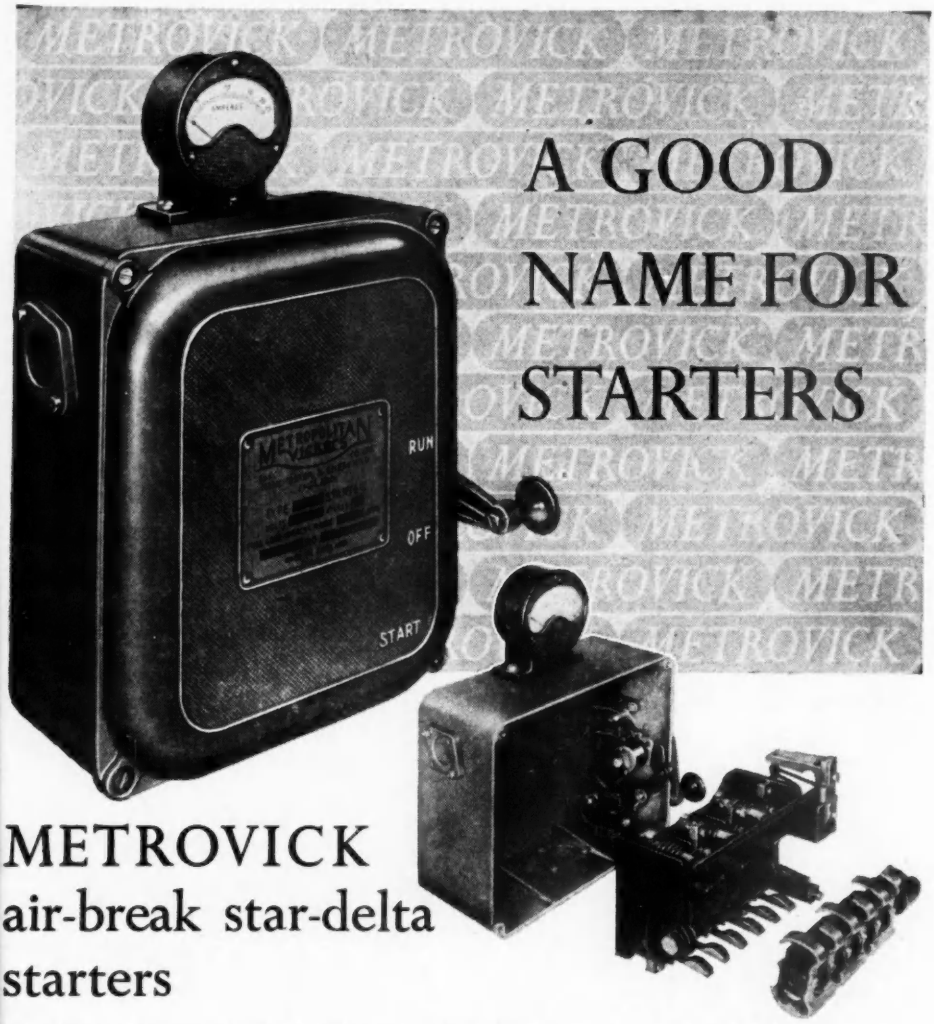
HENLEY CABLES

in their electrical installation work on the South Bank site, Festival of Britain Exhibition, 1951.

Consulting Engineers
Messrs. Freeman, Fox & Partners, 68 Victoria St. SW1

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51-53 Hatton Garden, London, E.C.I.

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS



A GOOD NAME FOR STARTERS

METROVICK air-break star-delta starters

The Metrovick reputation is based on sound engineering design and good workmanship. The standard is maintained in the type ASD series of starters which conform with BSS.587. They are suitable for squirrel cage motors up to 25 H.P. 650 volts and are available for immediate delivery. Write for full technical details.

Type ASD starters are intended for use in general industrial applications.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17
Member of the A.E.I. group of companies

METROVICK *Control Gear for all Motor Drives*

H/A006

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY BOROUGH OF SOUTHAMPTON

TO ELECTRICAL CONTRACTORS

TENDERS are hereby invited for the Electrical Installation at Southampton Technical College (Stage III).

Application to tender must be accompanied by a deposit of £5, or the Borough Treasurer's receipt for same, and must be addressed to, and reach, the Borough Architect not later than May 7, 1951.

The form of tender, specification and drawings together with supplemental conditions of contract will be forwarded to contractors who have applied as above.

The electrical contractor will be required to enter into a sub-contract with the main contractor in accordance with the conditions of the main contract.

The main contract will be the current form issued under the sanction of the Royal Institute of British Architects plus supplemental conditions and will be available for inspection at the Borough Architect's office.

Deposits will be returned on receipt of a bona fide tender (not subsequently withdrawn), or on return of the documents.

Tenders on the form and in the official envelope provided must be addressed to the Borough Architect and delivered not later than 10 a.m. on May 23, 1951

R. RONALD H. MEGGESON,
Town Clerk.

Civic Centre, Southampton. (K 612)

COUNTY BOROUGH OF SWANSEA

44 Houses at Penlan

TENDERS FOR ELECTRICAL INSTALLATION

ELECTRICAL engineers wishing to tender for the ELECTRICAL INSTALLATION for 44 houses at Penlan are invited to submit their applications to the Borough Architect, The Guildhall, Swansea, on or before May 26, 1951.

Plans, specification and conditions of contract will be forwarded on application and deposit of £2, provided applicant gives satisfactory evidence of having previously carried out work of a similar character.

The deposit will be refunded after delivery of a bona-fide tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other tender will be accepted.

T. B. BOWEN,
Town Clerk.

The Guildhall, Swansea.
April 30, 1951. (K 608)

STANLEY RIVER WORKS BOARD

Queensland

ELECTRICAL EQUIPMENT FOR SLUICE GATES SOMERSET DAM

TENDERS closing at noon on July 2, 1951, at the office of the Co-ordinator General of Public Works, Brisbane, are invited for the manufacture, supply and delivery of Electric Motors, Motor Starters and Control Equipment for 13 Sluice Gate Winches for Somerset Dam.

The plans and specification are on view at the office of the Agent General for Queensland, 409-410, Strand, London W.C.2, and copies may be obtained from the Chief Engineer Department of the Co-ordinator General of Public Works, Brisbane, Queensland, on payment of £1 per set.

The lowest or any tender will not necessarily be accepted.

Tenders should be endorsed "Tender—Sluice Gate Winch Motors."

L. H. PIKE,
Agent General for Queensland.
(K 491)

CITY OF BELFAST

Electricity Department

TENDERS are invited as under:—

FIRE-EXTINGUISHING EQUIPMENTS

The supply, delivery, and erection of carbon dioxide fire-extinguishing equipments for Electrical Sub-stations.

Form of Tender and specification (No. G.164) may be obtained at the Electricity Department, East Bridge Street, Belfast, on payment of a deposit of £2 2s. 0d., (cheques to be made payable to the Belfast Corporation Electricity Department), which deposit will be refunded provided a bona fide Tender be lodged and not withdrawn. Extra copies may be obtained at £1 1s. 0d. each, which sum will not be returnable.

Latest time for receipt of Tenders—4 p.m. on Friday, May 25, 1951.

ARMOURCLAD SWITCHGEAR

The supply, delivery, and erection of 6,600-volt, compound-filled armourclad switchgear of 250 MVA. capacity, during the period from July 1, 1951, till March 31, 1952.

Form of Tender (No. 10) and further particulars may be obtained at the Electricity Department, East Bridge Street, Belfast.

Latest time for receipt of Tenders—4 p.m. on Friday, May 25, 1951.

The following conditions apply to the above-mentioned Tenders: Each Tender, in sealed envelope marked "Tender for Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than the time specified.

An official receipt must be obtained for each Tender delivered by hand. Tenders sent by post should be registered.

The lowest or any Tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
April 26, 1951. (K 594)

MIDDLEWICH URBAN DISTRICT COUNCIL

ELECTRICAL WORK, 56 HOUSES
CHADWICK FIELDS ESTATE, MIDDLEWICH

TENDERS are invited for the Electrical Wiring of 56 Houses in course of construction on the Chadwick Fields Estate, Middlewich.

The conditions of contract, plans, specification and form of contract may be had from the Engineer's Department upon payment of 2 gns., which will be refunded on receipt of a bona-fide tender and return of all documents.

Tenders, in plain sealed envelopes bearing no mark of the sender, must reach the undersigned not later than noon on Wednesday, May 16, 1951.

The Council do not bind themselves to accept the lowest or any tender.

ARTHUR GOULDEN,
Clerk to the Council.

Victoria Building, Middlewich.
April 23, 1951. (K 552)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

JUNIOR ENGINEER (Control), Croydon "B" Power Station with suitable training and experience in the operation of E.H.T. switchgear and the parallel running of alternators. N.J.B. conditions of service and salary, Class "J," Grade 18, commencing at £375 and rising to a maximum of £478 per annum on Grade 14, plus London allowance.

Application forms obtainable from Divisional Secretary, British Electricity Authority, South Eastern Division, Lower Ham Road, Kingston-upon-Thames, Surrey, to be returned by May 12, 1951. (K 578)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

SHIFT CHARGE ENGINEER—Watford generating station.

Salary in accordance with the N.J.B. Schedule "A," Grade 7, Class "E" (£579-£609 per annum, plus London weighting).

Applicants should have served an apprenticeship and obtained an Ordinary National Certificate in electrical and/or mechanical engineering or equivalent, and possess experience in the operation of generating stations.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than May 12, 1951. Envelopes should be endorsed "Shift Charge Engineer—Watford."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (K 582)

BRITISH ELECTRICITY AUTHORITY

SCIENTIFIC STAFF, RESEARCH LABORATORIES
LEATHERHEAD

APPLICATIONS are invited for appointments on the Scientific Staff of the Chief Engineer's Department in the Research Laboratories at Leatherhead. Candidates should possess a University Degree with First or Second Class Honours in mechanical engineering. Preference will be given to candidates with some research experience.

Duties will include testing, development and research work in the laboratories and in the field in connection with the generation, transmission and distribution of electricity.

The appointments, which are superannuable, will be made within the following grades of the National Joint Board Agreement, Schedule "C" (Headquarters), according to qualifications and experience: General Assistant, Grade 5, £465 to £594 p.a. rising to a maximum of £656 p.a.; Third Assistant, Grade 4, £644-£769 p.a., rising to a maximum of £849 p.a.; Second Assistant, Grade 3, £719 to £969 p.a. rising to a maximum of £1,070 p.a.

Applications, stating age, present salary, and giving full details of qualifications and experience, should be forwarded to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Gt. Portland Street, W.1, so as to be received not later than May 18, 1951.

Please quote reference AE/162. (K 566)

BRITISH ELECTRICITY AUTHORITY

ASSISTANT IN THE CENTRAL INFORMATION SERVICE
HEADQUARTERS—LONDON

APPLICATIONS are invited for the above appointment in the Secretary's Department at Headquarters.

The work will largely consist of indexing and abstracting technical publications of interest to the electricity supply industry. It will also involve a certain amount of translating, together with information searches on particular subjects. Candidates should possess some knowledge of engineering and scientific subjects, together with experience in the translation from at least one foreign language. Knowledge of Russian would be an advantage.

Salary will be in accordance with experience and will be within Grade 3 of the National Joint Council (Administrative and Clerical) Grades, i.e. £480 plus £20 per annum, to £540 p.a. inclusive of London allowance.

Letters of application, stating age and giving details of experience, should be forwarded to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, to be received not later than May 26, 1951.

Please quote reference AE/164. (K 611)

BRITISH ELECTRICITY AUTHORITY

DEPUTY LABOUR RELATIONS OFFICER

APPLICATIONS are invited for the appointment of a Deputy Labour Relations Officer with special responsibilities in the negotiation of wages and conditions of service on behalf of the manual workers in the electricity supply industry. In addition to administrative experience, candidates should have some practical knowledge of wage negotiations.

The salary scale applicable to this appointment is £1,500 per annum rising by annual increments of £75 per annum to a maximum of £2,000 per annum, the point of entry being dependent on experience and qualifications.

Letters of application, stating age and giving full particulars of qualifications and experience, should be forwarded to D. Moffat, Esq., Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, so as to be received not later than May 16, 1951.

Please quote reference AE/168. (K 598)

BRITISH ELECTRICITY AUTHORITY

South Western Division

SENIOR ASSISTANT ENGINEER
SYSTEM OPERATION DEPARTMENT

APPLICATIONS are invited for the appointment of Senior Assistant Engineer in the system operation department at Divisional Headquarters, Bristol.

Applicants should be chartered electrical engineers, and should have a wide knowledge of the operation of a large interconnected power system, including power station statistics.

The successful applicant will be required to assist the system operation engineer in all branches of the work of the department and supervise the work of the Bristol Grid Control Centre.

The general conditions of employment will be those negotiated by the National Joint Board and the salary in accordance with schedule " C " Class AX/DX, Grade 1, £884-£1,015/£1,086-£1,108 per annum.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards superannuation scheme.

Applications, stating age, full details of general education, technical training and experience, with relevant dates, qualifications, present position and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than May 21, 1951.

R. C. BARRETT,
Divisional Secretary.

April 25, 1951. (K 571)

CROWN AGENTS FOR THE COLONIES

FITTER LINESMAN required for the Nyasaland Government Public Works Department, Electrical Services, for one tour of 24 to 36 months with prospect of permanency. Salary according to age and experience in the scale £570 rising to £865 a year. Cost of living allowance between £20 and £126 a year, according to salary and dependants. Outfit allowance £30. Free passages. Candidates (aged 23 to 35 years) must have had considerable experience of the erection, maintenance and testing of overhead distribution, up to 11 kV, using steel and wood supports, and be able to carry out all overhead line work including tensioning, erection of switchgear, transformers, etc. A knowledge of underground cable work would be an advantage.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.28353B, on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (K 501)

BRITISH ELECTRICITY AUTHORITY

London Division

ENGINEERING DRAUGHTSMAN
WEST HAM GENERATING STATION

APPLICATIONS are invited for the above position from candidates who have had a good training in connection with power-station maintenance.

The salary, which is provisional and subject to negotiation with the appropriate organisation, will range from £400 to £500, according to qualifications.

The appointment will be superannuable under the terms of the B.E.A. and Area Boards Superannuations Scheme.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(K 559)

CITY OF MANCHESTER

AMENDED ADVERTISEMENT

MAINTENANCE ENGINEER—
AIRPORTS DEPARTMENT

APPLICATIONS are invited from suitably qualified persons for the above post. The salary and conditions of service will be in accordance with Grade A.P.T. VI of the National Joint Council Scales, i.e., £595 rising by £20 x £20 x £25 annually to £660 per annum.

Details of the appointment and forms of application may be obtained from the Acting Airports Manager, Ringway Airport, Manchester, on receipt of a stamped addressed envelope, and the application forms should be returned to the same address by May 13, 1951. Canvassing is prohibited.

Previous applicants need not apply.

PHILIP B. DINGLE,
Town Clerk.

Town Hall,
Manchester 2. (K 481)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

APPLICATIONS are invited for appointments as SENIOR DRAUGHTSMEN (Mechanical) in the Generation (Construction) Department, Northern Group, Leeds.

The salaries, which should be regarded as provisional pending negotiations with such organisations as are appropriate, will be within the range £500 to £700 per annum according to qualifications and experience.

Duties will be largely concerned with the preparation and checking of drawings showing the layout of main ancillary plant and pipework in power stations under construction or in the project stages, and applicants should have had experience in one or more of the following:—

(1) General layout of power stations.
(2) Layout of turbines and ancillary plant.
(3) Layout of boilers and ancillary plant.

Experience in heavy engineering plant contractor's drawing office will be an advantage.

The appointment will be subject to the provisions of the Authority's superannuation scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed "Senior Draughtsmen (Mechanical)."

G. A. VOWLES,
Divisional Controller.
(K 601)

BRITISH ELECTRICITY AUTHORITY

London Division

GROUP EFFICIENCY AND TESTING ENGINEERS (TWO REQUIRED

CANDIDATES should have a degree in engineering or the requisite technical qualifications for corporate membership of the Institution of Mechanical Engineers or the Institution of Electrical Engineers. They should have experience in carrying out tests on the mechanical plant in power stations and be capable of preparing reports and interpreting the results of such tests.

The salary will be in accordance with Class "AX," Grade 2, of the revised N.J.B. Schedule, i.e. £789 12s. per annum to £928 4s. per annum, inclusive of London allowance.

The appointments are pensionable.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the publication of this advertisement.

J. N. WAITE,
Divisional Controller.
(K 557)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following post:—

WAYLEAVE OFFICER

Bracknell District of No. 1 (Southall) Sub-Area. Salary, N.J.C. Grade 2 (£390 to £450 per annum). N.J.C. conditions of service.

Applicants should have the ability to negotiate the purchase of land and all types of wayleaves for overhead and underground cables. A knowledge of the Town and Country Planning Act, 1947, and some surveying experience will be deemed an advantage.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' superannuation scheme, if eligible.

Applications, on forms obtainable from the Sub-Area Secretary, 2/6 Windmill Lane, Southall, Middlesex, and returned to him not later than ten days after the appearance of this notice.

F. W. KEMPTON,
Secretary.
(K 595)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of DEMONSTRATOR in the Stourbridge district. Applicants should have had a good general education and the possession of a recognised diploma in Domestic Science and Electrical Housecraft will be considered an advantage. Duties will include the conducting of lecture demonstrations both in the Service Centres and on consumers' premises, and advice to consumers on the selection and use of electrical apparatus. Training will be given where necessary to suitable applicants. The commencing salary and conditions of service will be in accordance with the National Joint Council Grade 1 within the range of £310 to £350 per annum, with further progress to £390 per annum subject to satisfactory service. The successful applicant will be required to contribute to the Board's Superannuation Scheme, if eligible.

Applications, in writing, stating age, education, etc., should be forwarded to Sub-Area Manager, Midlands Electricity Board, Toll End Road, Tipton, Staffs. (K 585)

BRITISH ELECTRICITY AUTHORITY

South Western Division

THIRD ASSISTANT ENGINEER—TRANSMISSION DEPARTMENT

APPLICATIONS are invited for the appointment of Third Assistant Engineer (Construction) in the transmission department at Divisional Headquarters, Bristol.

Applicants should have educational and engineering qualifications up to graduate I.E.E. standard, and should have had considerable engineering experience of switchgear and transformer contracts for major h.v.substations.

Duties will include assisting in the co-ordination of contract details, checking contract drawings and conducting correspondence.

The general conditions of employment will be those negotiated by the National Joint Board, and the salary in accordance with schedule " C " Class AX/CX, Grade 5, £579-£710/£738-£753 per annum.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation scheme.

Applications, stating age, full details of experience and qualifications, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than May 21, 1951.

R. C. BARRETT,
Divisional Secretary.
April 25, 1951. (K 570)

BRITISH ELECTRICITY AUTHORITY

London Division

MAINTENANCE ENGINEER (MECHANICAL) BLACKWALL POINT GENERATING STATION

CANDIDATES should have received a sound, technical and practical training and have had experience in the maintenance of modern generating plant including the complete overhaul of high pressure boilers and turbines and their associated equipment.

Salary in accordance with revised N.J.B. schedule, Class " F," Grade 6, plus London allowance equal £693 per annum.

The appointment will be superannuable.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(K 568)

HIS MAJESTY'S COLONIAL SERVICE

Colonial Engineering Service

VACANCIES IN AFRICAN COLONIES

THE Colonial Office announces that a competitive selection of pupils in Mechanical, Electrical and Telecommunications Engineering will take place shortly and applications should reach the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, in writing, by May 31 next. Engineering students whose degree examinations take place later this year may apply and may be provisionally selected, subject to success in their degree examinations and to their degrees giving exemption from Sections A and B of the respective Institutions examinations. Consideration can only be given to applications from candidates who are recently graduated engineers or who expect to graduate in the near future.

Further particulars regarding the Colonial Engineering Service and the Pupil Engineer Scheme can be obtained from the Director of Recruitment. (K 599)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT ENGINEER in District 462 (Newport) in the Eastern Sub-Area of the Board.

Preference will be given to applicants who possess an Engineering Degree of a British University, the Higher National Certificate or its equivalent, or have passed the Graduateship Examination of the Institution of Electrical Engineers.

The salary for the position will be in accordance with Class "F," Grade 11 (£482/£490/£498) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than May 12, 1951.

D. G. DODDS,
Secretary.
(K 603)

BRITISH ELECTRICITY AUTHORITY

London Division

SHIFT CHARGE ENGINEER
BECKENHAM GENERATING STATION

CANDIDATES should have received a sound engineering training and have had practical experience in the operation of power-station plant. They should also have received a sound technical training and have obtained the National or Higher National Certificate in electrical or mechanical engineering, or their equivalent.

Salary in accordance with revised N.J.B. Schedule, Class "B," Grade 7, plus London allowance £516 12s. per annum.

ASSISTANT SHIFT CHARGE ENGINEER
ST. MARYLEBONE GENERATING STATION

Candidates should have a sound technical training and experience in the running and efficient operation of boiler-house plant.

The position is mainly for boiler-house duties and the applicant should be capable of taking charge of the station operation when necessary.

Salary in accordance with revised N.J.B. Schedule, Class "E," Grade 9, plus London allowance £544 19s. per annum.

These posts are superannuable.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(K 556)

AIR MINISTRY

AIR MINISTRY invite applications for non-pensionable appointments as STATION ENGINEERS in the Directorate General of Works at R.A.F. stations.

The salary rises to a maximum of £560 per annum and starting pay depends upon age, experience and qualifications. Annual increases will be granted for satisfactory service where salary is below the maximum.

Candidates, who should be natural born British subjects, should have suitable practical experience and possess the following qualifications:—

(a) Ordinary National Certificate in Electrical Engineering or show that they have reached an equivalent standard of technical education; (b) have served a recognised apprenticeship in electrical engineering with a firm or establishment of good repute; (c) have had three years' employment in electrical engineering, preferably on the operation and maintenance of mine, factory or workshop plant and services.

Preference will be given to applicants who, subsequent to (b) and (c), have had experience of supervising staff.

The work consists of the installation, operation and maintenance of high or medium voltage electrical distribution systems, electrical installations, generating plant, steam and hot-water heating systems and miscellaneous works plant, tools and equipment.

Appointments to locations at or nearest to those specified in applications will be arranged as far as possible.

Applications, stating age, qualifications and all previous appointments (with dates), to be addressed to the Air Ministry, Directorate General of Works, W.9, Bush House, S.E. Wing, Strand, W.C. (K 583)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following positions:—

No. 431. ASSISTANT SHIFT CHARGE ENGINEER, Barton Generating Station, Urmston, nr. Manchester.
Salary range £609 to £633 in accordance with Grade 9, Class "H."

No. 432. SHIFT CHARGE ENGINEER, Stuart Street Generating Station, Bradford, Manchester 11.
Salary range £692 to £722 per annum, in accordance with Grade 7, Class "H."

No. 433. ASSISTANT ENGINEER (Boiler House), Ribble Generating Station, Penwortham, Preston.
Salary range £571 to £597 per annum, in accordance with Grade 10, Class "H."

Candidates for these positions should preferably possess technical qualifications, and previous experience in a Generating Station is desirable, and in the case of No. 433 previous experience in the operation of boiler house plant is desirable.

These positions are superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme, and the salaries are in accordance with the National Joint Board Agreement.

Applications, quoting Vacancy No., stating age, qualifications, present position, and giving full details of education and experience, should be received by The Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than May 12, 1951. (K 584)

BRITISH ELECTRICITY AUTHORITY

RESEARCH BRANCH
CHIEF ENGINEER'S DEPARTMENT

APPLICATIONS are invited for the following positions in the Research Branch of the Chief Engineer's Department in London. Successful candidates will be engaged in research on the corrosion of steel at boiler pressures.

(*a*) A PHYSICAL CHEMIST to act as team leader and to take charge of the laboratory under general direction from the B.E.A. headquarters organisation. Candidates must hold a good degree with a strong bias towards physical chemistry. They should have proved their capacity for research, preferably in corrosion, in electro-chemistry, or in some related subjects, or in physio-chemical measurements at high pressures. They should be competent theorists with sound practical outlook and ability to handle new types of equipment.

(*b*) A PHYSICAL CHEMIST who holds a good honours degree or expects to obtain one shortly. Applicants should be thoroughly interested in the theory and the experimental techniques that are associated with corrosion research, and they should be capable experimenters.

(*c*) An EXPERIMENTAL OFFICER to help with the experimental work. Candidates should have good knowledge of chemistry and should preferably have had experience of boiler operation or of the preparation and photomicrography of metallurgical specimens.

Starting salaries for the appointments, which are superannuable, will be determined according to qualifications and experience within the following Grades of Schedule "C" of the National Joint Board Agreement, which include London allowance:—Position (*a*) Grade 3, £755-£1,017, rising to £1,120 p.a.; position (*b*) Grade 5, £490-£624, rising to £689 p.a.; position (*c*) Grade 6, £400-£530, rising to £615 p.a. These grading allocations are subject to confirmation by the National Joint Board.

The successful candidates for positions (*a*) and (*b*) may take up their appointments on the first day of any month up to October, 1951.

Applications forms may be obtained from the Secretary's Office (Establishments), Application Section, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to D. Moffat, Esq., Director of Establishments, at the above address, not later than June 1, 1951.

Please quote reference AE/150. (K 597)

BRITISH ELECTRICITY AUTHORITY

London Division

ASSISTANT MECHANICAL ENGINEER (HANDLING BARKING GENERATING STATION

APPLICATIONS are invited for the above new appointment involving full co-ordination, safety, staff selection and administration of the yard and jetty department operation and maintenance, etc.

The plant, handling upwards of 1¼ million tons of coal per annum, includes grabbing cranes, drag scrapers, belt and G.B. conveyors, ash plants, bulldozers, locomotives, etc., and is being extended to serve also the new " C " station.

Candidates should have had a systematic engineering training and sound experience in the directions indicated. Knowledge of shipping, plant inspection, staff relations, etc., will be advantageous.

Salary and other conditions will be in line with the revised N.J.B. agreement, Class " M," Grade 9 (£819 to £846 6s. after 4 years, inclusive of London allowance), rising on commissioning of " C " station, to Class " N " (£859 19s. to £889 7s. p.a., after 4 years, inclusive of London allowance).

The appointment will be superannuable.

Applications, giving age and full details of training and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(K 567)

KENT COUNTY COUNCIL

APPLICATIONS are invited for the appointment in the Buildings Department of a SENIOR ENGINEERING ASSISTANT (Electrical) in A.P.T. Grade VI (£595-£660).

Applicants must be Corporate Members of the Institution of Electrical Engineers and be capable draughtsmen with good experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. The duties will include the preparation of drawings, inspection of premises and supervision of installations.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him within 14 days of the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.
County Hall, Maidstone. (K 516)

NORTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 2 Sub-Area

SENIOR ASSISTANT ENGINEER
(Operation and Maintenance)
Sub-Area Mains Engineer's Department

The salary for the post will be in accordance with the National Joint Board Revised Agreement, Class "L," Grade 4, i.e. £1,075/£1,100/£1,125 per annum.

Applicants should have had a sound training in electrical engineering and have knowledge of the operation of an extensive overhead and underground distribution system on voltages up to and including 33 kV. They should be capable of carrying out the location of underground and overhead faults and programming the general maintenance and overhaul of the overhead and underground systems. Experience is required in the maintenance of sub-station equipment, including switchgear, transformers and buildings. Applicants should be fully conversant with the Safety Regulations and Factory Acts applicable to the Electricity Supply Industry.

Corporate membership of the Institution of Electrical Engineers would be an advantage.

Applications, stating age, training and experience, qualifications, present post and salary, should be received by E. G. Wardle, A.M.I.E.E., Sub-Area Manager, No. 2 Sub-Area, the North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester 3, not later than Saturday, May 12, 1951.

No. 7 Sub-Area

THIRD ASSISTANT ENGINEER
(Sub-Area Installation Inspection Engineer) Sub-Area Technical Engineer's Department

Applications are invited for the position of Third Assistant Engineer (Sub-Area Installation Inspection Engineer) in the No. 7 Sub-Area Technical Engineer's Department, based on Romiley, Cheshire.

The person appointed will be responsible to the Sub-Area Testing Superintendent for the co-ordination of installation inspection and meter fixing work throughout the Sub-Area.

Applicants should have experience in the inspection of all classes of electrical installation, also the fixing and wiring of domestic and industrial metering equipment. A technical training to Higher National Certificate standard is desirable.

The conditions of service will be those approved by the National Joint Board for the Electricity Supply Industry, and the salary will be in accordance with the National Joint Board Revised Agreement, Class "G," Grade 10, i.e. £539/550/£561 per annum.

Applications, stating age, experience, qualifications, present post and salary, should be received by the Sub-Area Manager, No. 7 Sub-Area, the North Western Electricity Board, Chapel Street, Hazel Grove, Stockport, not later than Saturday, May 12, 1951. (K 605)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ENGINEERING ASSISTANTS
GENERATION CONSTRUCTION DEPARTMENT

APPLICATIONS are invited from suitably qualified candidates for the following appointments in the Generation Construction Department, Bristol :—

(a) SECOND ASSISTANT ENGINEER (Mechanical)
(b) THIRD ASSISTANT ENGINEER (Mechanical)
(c) GENERAL ASSISTANT ENGINEER (Mechanical)

Applicants should have good general mechanical, engineering, technical and works training, preferably with experience in the design, specification and layout of power station plant.

(d) THIRD ASSISTANT ENGINEER (Electrical)
(e) GENERAL ASSISTANT ENGINEER (Electrical)

Applicants should have had appropriate technical and works training, and be familiar with modern practice in respect of transformers, motors, switch and control gear. Experience in the design, specification and layout of power station electrical equipment would be considered an advantage.

The general conditions of employment will be those negotiated by the National Joint Board, and the salaries in accordance with schedule " C," Class AX/CX as follows:

Second Assistant, Grade 2, £752-£884/£920-£938 per annum.
Third Assistant, Grade 5, £579-£710/£738-£753 per annum.
General Assistant, Grade 8, £437-£569/£592-£604 p.a.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, and should be returned to him not later than May 21, 1951.

R. C. BARRETT,
Divisional Secretary.

April 25, 1951. (K 569)

UGANDA ELECTRICITY BOARD

APPLICATIONS are invited for the undermentioned appointments in connection with the electrical development of Uganda, East Africa.

SHIFT CHARGE ENGINEER. To take charge of a shift in one of the Board's diesel-engine power stations and to assist in maintenance work. Applicants should have had a sound engineering training and experience in diesel-engine maintenance and in power-station operation.

ELECTRICIAN. To carry out repairs to domestic electrical equipment. The successful applicant will be required to undertake and organise repair, reconditioning and testing of cookers, refrigerators, water heaters and small domestic appliances and should have had a sound electrical training and subsequent experience in this work.

DRAUGHTSMAN. Applicants should have had a sound training as a General Draughtsman, preferably with an electricity supply undertaking, and should be able to adapt themselves to all types of draughtsmanship. A knowledge of mains records and power-station cable records would be an advantage.

The salary in each case will be in the scale £580: £580 by £40 to £780 per annum plus a cost-of-living allowance of 15% and the point of entry on the scale will be dependent on the applicant's experience. Rent-free, partly furnished quarters will be provided or an allowance paid in lieu thereof. Free medical and dental services are provided.

First contract will be for three years with 90 days' vacation leave (or 180 days if contract is renewed) on full salary at the end thereof. Local leave may also be granted up to a total of 36 days during the period of the contract. The candidate selected would be required to join the Board's Provident Fund Scheme. A free passage will be provided for the selected candidate and, if married, for his wife and children under 18 years of age (up to a maximum of one adult fare in respect of children).

Uganda has an equable and healthy climate, the mean temperature ranging between 58° F. and 92° F.

Forms of application may be obtained from and should be returned to the London Office of the Uganda Electricity Board, 129 Grand Buildings, Trafalgar Square, London, W.C.2.

C. R. WESTLAKE,
Chairman.

P.O. Box 559, Kampala,
Uganda, East Africa. (K 553)

BRITISH ELECTRICITY AUTHORITY

London Division

DEPUTY STATION SUPERINTENDENT
LOMBARD ROAD GENERATING STATION

CANDIDATES should have had a sound engineering training and hold qualifications up to at least Higher National Certificate, followed by some years' experience in the operation and maintenance of a power station.

Salary in accordance with revised N.J.B. Schedule, Class "F," Grade 3, i.e. £868 7s. p.a., inclusive of London allowance.

TURBINE HOUSE AND ELECTRICAL
SUPERINTENDENT
DEPTFORD EAST GENERATING STATION

Candidates should have received a sound mechanical and electrical engineering training and technical education, preferably up to Higher National Certificate standard. They should have had wide experience in the operation and maintenance of turbine plant and auxiliary equipment, in the operation, maintenance and repair of e.h.t. switchgear, transformers, electrical machines, control gear, wiring and cabling, and the maintenance of electrical equipment generally.

Salary in accordance with revised N.J.B. Schedule, Class "H," Grade 6, i.e. £778 11s. p.a., inclusive of London allowance.

These posts are superannuable.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(K 558)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the position of INFORMATION OFFICER at Board Headquarters, Bristol. Commencing salary within the range £705 to £1,020 per annum, according to qualifications and experience.

Applicants should preferably possess a university education, a knowledge of printing processes and layout (production of staff magazine), and have experience in Press relations and preparation of material for publication. An intimate knowledge of South-west England will be an advantage.

Applications, giving age, qualifications and experience, present appointment and salary, to the Assistant Secretary (Establishments), Electricity House, Colston Avenue, Bristol 1, within 14 days. (K 554)

ELECTRICITY SUPPLY COMMISSION OF THE UNION OF SOUTH AFRICA

RAND UNDERTAKING

THE Rand Undertaking of the Electricity Supply Commission of the Union of South Africa invites applications for the positions enumerated below.

The Undertaking operates seven steam stations with two more under construction; the sustained load exceeds 900 MW and is expected to exceed 1,500 MW in the course of the next few years; annual sales are now in excess of 5,000 million. The area of supply is 28,000 square miles centred on Johannesburg, with transmission at 132 and 88 kV and distribution at 88, 42, 21 kV and lower voltages.

The salaries stated are the minimum starting salaries. In addition cost-of-living allowance is paid based on a sliding scale, and is at present £185 per annum. Actual commencing salaries will be determined by qualifications and experience. All positions offer good prospects of advancement to men of ability, energy and initiative.

Pension

On appointment to the Permanent Staff employees are required to join the E.S.C. Pension Fund, to which their contribution is approximately 6 per cent. of their salary.

Leave

Leave is granted on the following scale:—

Class	1	2	3
Salary scale	£720 and over	£480-£719	£300-£479
Weeks per annum, of which one week may be accumulated	4	4	4
Bonus leave: Weeks per annum	2	1	0

Bonus leave at the above rate accrues after the completion of five years' service.

Favourable sick leave privileges.

Passage to South Africa

Rail and sea passage in class appropriate to position will be provided for selected applicants provided they agree to serve the Commission for at least two years.

Applications marked "Rand Undertaking Vacancies," stating age, place of birth, whether married or single, details of general and technical education, qualifications, details of engineering experience and positions held, with copies of testimonials, should be addressed to:

The London Representative,
Electricity Supply Commission (South Africa),
535-546 The Adelphi,
London W.C.2.

ASSISTANT CONSTRUCTION ENGINEER

System Extension Construction Department

This department is responsible for the erection of 132 kV, 88 kV, 40 kV and lower voltage overhead lines and for the installation of electrical equipment of similar voltages in distribution stations and sub-stations. The occupant of the above post will assist the System Construction Engineer in the general administration of the Department and should have had sound technical training and possess organising ability with previous experience in the control of personnel and in the construction and installation of electrical equipment and transmission lines. Salary £1,100 per annum, plus cost-of-living allowance.

CONTROL ENGINEERS

System Operation Department

Applicants should possess a B.Sc. Degree in Electrical Engineering or equivalent technical qualification and have had considerable practical experience in the operation of large interconnected power stations and transmission and distribution systems. Duties will comprise supervision of all plant loading and switching operations during an 8-hour shift (48-hour week). Salary, £800 per annum, plus cost-of-living allowance.

SENIOR ASSISTANT TESTING ENGINEER

To assist the Testing Engineer in the general administration and supervision of the protection section of the Testing Department. Applicants must have sound technical knowledge of, and practical experience in, the development, selection, installation and maintenance of protective equipment on a large power supply system, and also have experience in semi-automatic and automatic control equipment. Experience in organising and controlling staff is essential. The possession of a B.Sc. Degree in Electrical Engineering or equivalent technical qualification and/or corporate membership of the Institution of Electrical Engineers would be a primary recommendation. Salary £930 per annum, plus cost-of-living allowance.

CONSTRUCTION SUPERVISOR AND ASSISTANT CONSTRUCTION SUPERVISOR

System Extensions Construction Department

Applicants will be required to organise and supervise the installation of 132 kV, 88 kV, 40 kV and lower voltage equipment in distribution stations and sub-stations and should have sound technical knowledge and previous practical experience commensurate with the above requirements.

The salary for the Construction Supervisor is £720 per annum and for the Assistant Construction Supervisor £582 per annum, in each case plus cost-of-living allowance.

SECTIONAL ENGINEERS

Distribution Department

A Sectional Engineer is responsible for the general administration of a section of the system and for the supervision of the operation and maintenance of 132 kV, 88 kV, 40 kV and lower voltage distribution stations, sub-stations, transmission and distribution circuits of that section.

The possession of a B.Sc. Degree in Electrical Engineering or equivalent and/or corporate membership of the Institution of Electrical Engineers would be a primary recommendation.

Applicants should possess organising ability and have had previous practical experience commensurate with the above duties. Salary £720 per annum, plus cost-of-living allowance, and housing at concession rental.

POWER STATION ASSISTANT RESIDENT ENGINEERS

Applicants should have had a sound technical training and considerable practical experience in the operation of steam generating plant, main and auxiliary switchgear and in the control of power station personnel.

Salary £720 per annum, plus cost-of-living allowance, with the eventual occupation of a house at concession rental.

SHIFT ENGINEERS AND JUNIOR SHIFT ENGINEERS

Applicants should have had a good technical training and sound practical experience in the operation of steam generating plant and main and auxiliary switchgear.

Salary for Shift Engineer, £618 per annum, and for Junior Shift Engineer £516 per annum, in each case plus cost-of-living allowance, with the possibility of occupying a house at concession rental.

ASSISTANT TESTING ENGINEERS

To carry out the installation, testing and maintenance of protective and automatic control equipment on a large power supply system. Applicants should possess a B.Sc. Degree in Electrical Engineering or equivalent technical qualification, have served a two-year pupilage and had subsequent practical experience with protective and control equipment. Salary £630 per annum, plus cost-of-living allowance.

ASSISTANT DISTRICT ENGINEERS

Applicants should have good technical knowledge and will be required to assist in the operation and maintenance of 132 kV, 88 kV, 40 kV and lower voltage distribution stations and sub-stations and the operation, maintenance and repair of transmission and distribution lines. Previous experience on similar work essential. Salary £444 per annum, plus cost-of-living allowance, and housing at concession rentals to married men. (K 545)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Glasgow Sub-Area

APPLICATIONS are invited for the following appointments at Sub-Area Headquarters.

SECOND ASSISTANT ENGINEER (Planning and Development).

Applicants should have a wide experience in the design and layout of large underground distribution systems at pressures up to and including 33 kV, in a densely loaded industrial and residential area. A knowledge and application of modern protection equipment, the calculation of fault levels and the preparation of load flow diagrams is essential.

SECOND ASSISTANT ENGINEER (Operation and Maintenance)

Applicants should preferably have a wide experience of the operation and maintenance of large underground e.h.v. and l.v. distribution systems which should include switchgear up to 750 MVA capacity at 33 kV, large transformer units and the various types of protection equipment, in a densely loaded industrial and residential area.

Preference will be given to candidates holding corporate membership of the Institution of Electrical Engineers or equivalent qualification.

The salaries for both positions will be in accordance with the National Joint Board Agreement, Class "E," Grade 7, at present £786/£822 per annum. The appointments will be superannuable under the British Electricity Authority and Area Boards superannuation scheme.

Application should be made on the official form, which may be obtained from the undersigned, and which should be completed and returned not later than Monday, May 28, 1951.

JOHN CAIRNS,
Secretary.

75 Waterloo Street, Glasgow C.2.
April 25, 1951. (K 561)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 3 (Sheffield) Sub-Area

GENERAL ASSISTANCE ENGINEER
(Testing and Protection) (Vacancy No. 53/51)

Applicants must hold, at least, the Higher National Certificate in Electrical Engineering and should have had experience of protective equipment on 66 kV, 33 kV, 11 kV and L.V. power systems. Experience on telephone and communication systems will be an advantage.

Salary—N.J.B., Schedule Class "M," Grade 13, £590 to £610 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, within 14 days of the appearance of this advertisement.

No. 5 (Wakefield) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
(Barnsley) (Vacancy No. 53/51)

Applicants must have had a sound practical training and considerable experience in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution networks, sub-station plant and ancillary equipment. Preference will be given to applicants who are corporate members of the Institution of Electrical Engineers, or who hold equivalent qualifications.

Salary—N.J.B. Schedule, Class "F," Grade 7, £625 to £643 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within 14 days of the appearance of this advertisement. (K 585)

LONDON ELECTRICITY BOARD

SECTION HEAD—TARIFFS AND STATISTICAL SECTION

APPLICATIONS are invited for the above appointment in the Southern Sub-Area Commercial Staff at Beckenham, Kent.

Applicants must possess sound knowledge of the structure and application of tariffs and the compilation, analysis and presentation of statistics. Experience in the organisation and administration of large consumers' service offices and ancillary records will be an advantage. Preference will be given to applicants with some technical experience.

Pending grading of the post under the national agreement of the appropriate negotiating body, the commencing salary will be £900 per annum inclusive.

Application forms from Establishments Officer, 46 New Broad Street, E.C.2, to be returned duly completed within seven days of the appearance of this advertisement. Please enclose addressed foolscap envelope and quote Ref. EST/V/1120/T. on all correspondence. (K 555)

EASTERN ELECTRICITY BOARD

Chilterns Sub-Area

APPOINTMENT of: (*a*) DEMONSTRATOR OR HOUSECRAFT ADVISOR
(*b*) TRAINEE DEMONSTRATOR.

Applications are invited for the position of Demonstrator or Housecraft Advisor and a Trainee Demonstrator in the Aylesbury District.

Applicants for the post of Demonstrator (*a*), should have had a domestic science training including electrical housecraft and should preferably hold the E.A.W. certificate. They should be competent to plan and give cookery demonstrations including lectures and advice to consumers on the utilisation of domestic appliances. Previous experience in an electricity service centre is desirable.

The salary will be in accordance with the National Joint Council (Administrative and Clerical Grades) Salary Agreement, Grade 1, i.e. £310 by £20 to £390 per annum.

A successful applicant having adequate experience and the additional qualifications of the E.A.W. Diploma may, however, be appointed as Housecraft Advisor with a salary in accordance with Grade 2 of the above mentioned Agreement, i.e. £390 by £20 to £450.

Applicants for the post of Trainee Demonstrator (*b*) should have commenced and be prepared to continue studies likely to lead to the qualifications mentioned above. For this appointment the commencing salary would be in accordance with the National Joint Council General Clerical Grade, i.e. £108-£308, dependent upon age. Further salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to work service centre hours and live in the Aylesbury district, contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, in writing, stating age, qualifications, experience and details of present employment and salary, should be addressed to the District Manager, Aylesbury, Eastern Electricity Board, Exchange Street, Aylesbury, so as to reach him within fourteen days of the appearance of this advertisement. (K 596)

BRITISH ELECTRICITY AUTHORITY

North-Eastern Division

APPOINTMENT OF GENERAL ASSISTANT ENGINEER ELECTRICAL PROTECTIVE GEAR AND TESTING SECTION TECHNICAL DEPARTMENT

APPLICATIONS are invited for the position of General Assistant Engineer in the Electrical Protective Gear Section of the Technical Department. Applicants should possess qualifications of Graduate I.E.E. standard and have had engineering works training. Experience of protective gear would be an advantage.

The salary for this appointment will be in accordance with Grade 8, Schedule "C" of the National Joint Board Agreement (£437-£604 per annum) and commence at a point commensurate with qualifications and experience.

Superannuation will be in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary (Establishments), British Electricity Authority, North Eastern Division, Carliol House, Newcastle upon Tyne 1, to whom they should be returned to arrive not later than May 19, 1951. (K 600)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of FIRST ASSISTANT DISTRICT ENGINEER in District 443 (Ebbw Vale) of the Eastern Sub-Area of the Board.

Applicants should have experience in the construction, operation and maintenance of substations and underground and overhead high and low voltage mains in urban and rural areas.

Preference will be given to applicants who possess an Engineering Degree of a British University, the Higher National Certificate or its equivalent, or have passed the Graduateship Examination of the Institution of Electrical Engineers.

The salary for the position will be in accordance with Class "E," Grade 4 (£722/£737/£752) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than May 12, 1951.

D. G. DODDS,
Secretary.
(K 604)

DRAKE AND GORHAM (CONTRACTORS) LTD. have a vacancy on their London staff for a SENIOR SUPERVISING ENGINEER. Must have had previous experience in a contractor's office. Apply to the Secretary, 36 Grosvenor Gardens, London, S.W.1, with details of education, experience, age and salary required. (K 562)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments at East Power Station, Newport, at salaries in accordance with the revised National Joint Board Agreement.

(*a*) ASSISTANT MECHANICAL MAINTENANCE ENGINEER, Class F, Grade 9 (£538-£560 per annum).

(*b*) STATION SHIFT CONTROL ENGINEER, Class "F" Grade 10 (£510-£530 per annum).

Applicants for both appointments should preferably have obtained the Higher National Certificate or its equivalent, and served a regular apprenticeship.

Applicants for (*a*) should have had sound experience in the operation and maintenance of h.p. and i.p. boilers, and turbines; those for (*b*) should preferably have had experience in the control room of a modern power station.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below to whom completed forms should be returned not later than May 14, 1951.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport, Cardiff. (K 602)

APPLICATIONS are invited by the English Electric Co., Ltd., for vacancies for ENGINEERS to deal with all orders taken by the Company for Steel Works Installations and other Metal Industries projects. These comprehensive orders cover the whole field of electrical equipment, supply switchgear, rectifiers, rotating machinery, control gear and electronic apparatus. Applicants should be young men who have served a recognised relevant apprenticeship, and who have at least Higher National Certificate. The positions are permanent and progressive, and afford excellent opportunities.—Please write, giving full details and quoting Ref. 489, to Central Personnel Services, English Electric Co., Ltd., 24/30 Gillingham Street, London, S.W.1. (K 460)

ARMATURE WINDER required in repair and rewind department. Excellent prospects and rates.—Max Arc and Electrics, Ltd., 190 Thornton Road, Croydon. (K 494)

ASSISTANT required for Sales Manager of progressive manufacturer of automatic control equipment. Successful candidate must have electrical engineering degree, and sound technical ability is more important than selling ability. Age 30/35. Salary approximately £1,000 per annum.—Send full particulars, tabulated and typewritten, with covering letter in own handwriting, to Box No. 5071, Electrical Times. (K 466)

CHIEF ELECTRICAL DESIGNER, a.c. motors. Leading electrical manufacturers in the north of England invite applications for the above vacancy. Applicants must be first-class designers having full and up-to-date experience of the development and design of modern a.c. industrial motors up to 250 h.p., and must have held a similar position. The post, which is superannuable, is an important one and will carry appropriate remuneration; housing assistance will be given if necessary.—Applications, giving full details of general and technical education and experience will be treated as strictly confidential, and should be addressed to the Works Director, Box No. 5081, Electrical Times. (K 499)

CONTRACTS AND ESTIMATING ENGINEER required by company manufacturing heavy electrical equipment in Midlands area. Applicants must have H.N.C. or equivalent, served apprenticeship electrical/mechanical engineering, and have experience in similar occupation in heavy electrical industry. Age 30-40 years. Good salary for experienced man.—Write, giving full details, to Box No. 6003, Electrical Times. (K 580)

ELECTRICAL Contractors in Weston-Super-Mare require an experienced COSTS CLERK, preferably man capable of taking over office administration.—Box No. 5097, Electrical Times. (K 551)

ELECTRICAL DRAUGHTSMAN, familiar with light mechanisms or instruments and preferably with some circuit experience, required by Dowty Equipment, Ltd., Arle Court, Cheltenham, for their electrical development department. Age 21-25. Higher National Certificate preferred. The factory is ideally situated in the grounds of a country house and working conditions are excellent. Write to Personnel Manager, stating age, experience and salary required. (K 564)

ELECTRICAL switchgear manufacturers in Manchester district require a first-class SECTION LEADER for the development department in the drawing office. Only first-class men will be considered who have had experience on all classes of switchgear up to 11kV and motor control gear. Good salary for the right man.—Reply, stating age, experience, and technical qualifications, to Box No. 5089, Electrical Times. (K 525)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ESTABLISHED British company requires SENIOR ELECTRICAL DRAUGHTSMEN, due to further expansion. Experience of power distribution and lighting installations as required for the Oil Refinery and Chemical industry preferable. Qualifications to H.N.C. standard. Substantial salaries paid.—Write, stating age, qualifications and experience, to Box 4106, c/o Charles Barker and Sons Ltd., 31 Budge Row, London E.C.4. (K 458)

ESTIMATING, CONTRACTS AND COST ENGINEER required by a company in the Midlands manufacturing diesel electric locomotives. Applicants must have H.N.C. or equivalent, served full apprenticeship in heavy electrical/mechanical engineering and have experience in similar occupation in diesel locomotive industry. Age 30-40 years. Salary £700-£900, dependent on experience.—Write, giving full details, to Box No. 6005, Electrical Times. (K 581)

EXPERIENCED LINESMEN required for power-line construction work in all parts of the British Isles at London rates.—Please apply in writing to Contract Department, Henley's Telegraph Works, 58-62 High Holborn, London W.C.1, giving age and details of recent experience. (K 432)

HANDLEY PAGE LTD. require an ELECTRICAL TECHNICIAN, preferably with H.N.C. (Elect.) and with a knowledge of electronics for work in connection with the development of aircraft electrical circuits and installations.—Write, stating age, qualifications and details of experience to: Staff Officer, Handley Page Ltd., Cricklewood, London N.W.2. (K 486)

MAJOR oil company require an ELECTRICAL ENGINEER for permanent employment in a refinery expansion project. Candidates should be corporate members of the Institute of Electrical Engineers, an engineering degree being an advantage. They should have a thorough works training and experience in a department covering construction, installation, operation and maintenance of 11 kV e.h.v. and l.v. power networks. Experience of industrial machinery and electric motors an advantage. Candidates should possess a wide knowledge of U.K. modern methods of network control and system operation also up-to-date experience of large transformers, switchgear and associated equipment. Also CABLE NETWORK ENGINEER. Candidates should be thoroughly experienced in modern technique of jointing, laying, testing and operation of underground cable networks from 11 kV to low voltages. He should be conversant with the procedure for supervising contracts and staff. The possession of Higher National Certificate would be an advantage. Salary in accordance with age and qualifications.—Write, giving full details and quoting Department I.R/50 to Box 6203 at 191 Gresham House, E.C.2. (K 506)

POWER PLANT CHARGE ENGINEER required by major oil company for employment in the Middle East to operate a combined gas and steam turbine station where he will take charge of a shift. Applicants who should be under 30 years of age, must possess a Higher National Certificate in electrical engineering and have served an apprenticeship in the generation division of a power supply organisation undertaking power station control room operation, followed by experience as a boiler house or turbine room charge engineer. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages, kit allowance, free medical attention, good leave arrangements, pension scheme.—Write, stating personal particulars and details of qualifications and experience, quoting Dept. F.13.F to Box 3336 at 191 Gresham House, E.C.2 (H 418)

REQUIRED SENIOR AND JUNIOR TRANSFORMER SALES ENGINEERS with experience in sales and contract working.—Please apply, giving full details of experience and salary required to Hackbridge and Hewittic Electric Co. Ltd., Hersham, Walton-on-Thames. (K 454)

REQUIRED, SENIOR CLERK in London depot of well-known manufacturer of electric cookers, street-lighting equipment, fittings and switchgear, for dealing with customers' queries and enquiries; also progressing. Knowledge of the trade essential.—State age, experience and salary required to Box No. 5095, Electrical Times. (K 528)

ROTARY SUB-STATION ATTENDANT with H.T. Switching experience required for shift duties at Lower Cherwell Street, Banbury. Present rate 2s. 1½d. per hour, N.J.I.C. conditions.—Apply in writing, District Manager, Midlands Electricity Board, 15/17 Bridge Street, Banbury, Oxon. (K 592)

STAFF FOREMAN (supervising), age 30-35, capable of planning and carrying out electrical wiring contracts and controlling site labour. Progressive position.—Write fully, stating age and experience, to W. J. Furse and Co. (London), Ltd., 9 Carteret Street, Westminster, S.W.1. (K 589)

SUPERVISING ELECTRICAL ENGINEER capable of handling all classes of wiring contract, able to prepare technical specifications and estimates and to carry through contracts to final accounts. Permanent position.—Write fully, stating age and experience, to W. J. Furse and Co. (London), Ltd., 9 Carteret Street, Westminster, S.W.1. (K 588)

THE General Electric Co. Ltd. has vacancies in the Fractional Horse Power Motor and Fan Department at their Head Office in London for SALES CORRESPONDENTS. Applicants should be between 21 and 30 years of age and have had a good general education and some previous experience in this type of work.—Apply in writing, giving full details of education and experience to the Staff Manager, The General Electric Co. Ltd., Magnet House, Kingsway, W.C.2. (K 609)

THE General Electric Co. Ltd. has a vacancy for an INSTALLATIONS ENGINEER in the Contract Department of their Calcutta Branch. A single man between 25 and 30 years of age would be preferred, but applications from older married men will be considered. Practical and Estimating experience in both power and lighting installation work is essential. This position is pensionable and there are good opportunities for promotion.—Apply in writing, giving full particulars of education, training and experience to Staff Manager, Magnet House, Kingsway, W.C.2. (K 610)

THE STEEL COMPANY OF WALES, LTD., require for Trostre Works, Llanelly, SHIFT TECHNICIANS for electrical maintenance of roll mill drives. Applicants must be of Ordinary National Certificate standard (minimum requirement) and be used to controlling labour. Apply before May 12, 1951, to Supt. Labour and Wages, The Steel Company of Wales, Ltd. (Tinplate Division), Carmarthen Road, Swansea. (K 563)

TRANSFORMER DRAUGHTSMAN required for South London Factory on power transformers up to 3,000 kVA, 66 kV. Wide variety of work in good conditions. Preference will be given to holders of Ordinary National Certificate or Higher National Certificate.—Apply, Box No. 6009, Electrical Times. (K 606)

TRANSFORMER ENGINEER, for preparation of quotations on Home and Export Enquiries. Knowledge of estimating with works experience and Higher National Certificate preferred.—Apply, Box No. 6011, Electrical Times. (K 607)

TRANSFORMER TEST FOREMAN required by a large manufacturing organisation. Applicants, who should preferably hold the higher national certificate, must have first class experience in the testing of all types of power and instrument transformers, and the ability to control staff.—Reply, giving full details of qualifications and experience, together with age, salary required, to Box No. 5091, Electrical Times. (K 526)

WELL established electricity meter manufacturers require the services of GRADUATE ENGINEERS for their development laboratory. Applicants possessing Higher National Certificate in Electrical Engineering or approaching that standard will be considered.—Written applications, giving details of qualifications and experience to Box No. 6007, Electrical Times. (K 591)

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ELECTRICIAN (31), fully conversant contracting and maintenance; good references; married accommodation required.—Box No. 5045, Electrical Times. (K 391)

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A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines), Service Electric Co. Ltd., Stanmore, Middx. (D 324)

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ELECTRICAL STEEL OFF-CUTS OR COREPLATES required. Small and large quantities taken, approx. 0.024-in. gauge, minimum width 3 in.—Box No. 4077, Electrical Times. (K 219)

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REQUIRED, "Admiralty" pattern 220 V d.c. 180/220 V 1-phase 1,000 cycles ROTARY CONVERTERS.—Oldfield Engineering Co. Ltd., 96 East Ordsall Lane, Salford 5. (K 488)

REQUIRED urgently, Dynamic balancing of approx. 1/12th fractional h.p. armatures. Alternatively, manufacturer required to supply 1/12th f.h.p. motor unit to specification.—Contact The W.S. and V.C.S. Ltd., 248 Romford Road, Forest Gate, E.7. (K 574)

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WANTED, SCRAP ELECTRIC MOTORS, DYNAMOS AND CABLE. Top prices paid.—H. Reed, 36 Bridge Street, Leatherhead, Surrey. (K 11)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

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WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co. Ltd., 22-26 Britannia Walk, London N.1. (A 13)

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AGENT-STOCKIST required for Bristol area, by well-known cable manufacturer (C.M.A.).—Reply, giving full details, to Box No. 5099, Electrical Times. (K 577)

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OFFERS are invited for the purchase, dismantling and removal of the following plant from the Power Station, North Lane, Elgin, Morayshire.

One 400 kW Ruston/Mather and Platt DIESEL GENERATOR SET, direct-coupled, 300 r.p.m., 480/530 V, d.c.

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Arrangements to inspect the plant may be made with the undersigned, to whom the tenders should be addressed.

The Board does not bind itself to accept the highest or any offer.

A. CLERK,
Area Manager.

West Villa,
Elgin, Morayshire. (K 576)

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TRANSTAR CONTROL GEAR. "Winco" FLUORESCENT FITTINGS. "Winco" DISTRIBUTION BOARDS. Special prices on application. Metal-clad, 2-way SPLITTERS, 7s. 6d. each. Arrow 60-amp. D.P. SWITCHES, 10s. each. 14 gauge GALV. CHAIN, 6s. doz. yards. BATTEN HOLDERS, 12s. doz. L.B.C.C.G. HOLDERS, 9s. doz. 15-amp. shutter-type PLUGS and SOCKETS, 6s. each. Factors of Cable, Flexes, Switchgear, Cable Clips, etc. Carriage and packing paid on orders of £10 or over.

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A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel.: 7232. (A 12)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

FOR SALE, 100 F.H.P. MOTOR UNITS, 200/250 V, universal. Approximately 1/12th h.p., 6,000 to 8,000 r.p.m., encased in aluminium housing, ¼-in. ball bearings with ¼-in. shaft. Threaded left hand. £100 lot, or 25s. per single unit.—The W.S. and V.C.S. Ltd., 248 Romford Road, Forest Gate, E.7. (K 575)

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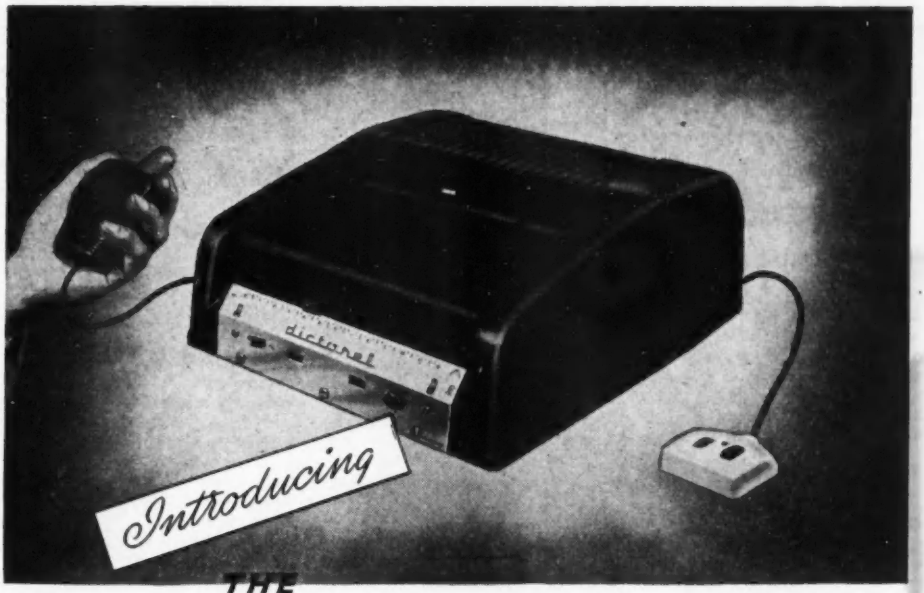
THE proprietor of British Patent No. 599591, entitled "MOUNTING FOR ELECTRIC ARC FURNACE ELECTRODES," offers same for licence or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14 East Jackson Boulevard, Chicago 4, Illinois, U.S.A. (K 503)



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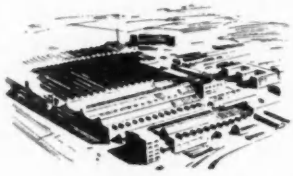

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90	750	Brook	S. Protected	Slip Ring
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75	740	Crom-Park.	T.E.F.C.	Slip Ring
70	1,000	Brook	S. Protected	Slip Ring
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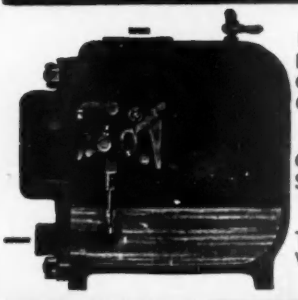

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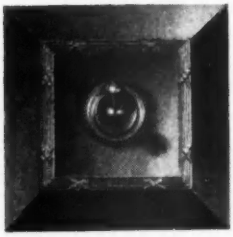

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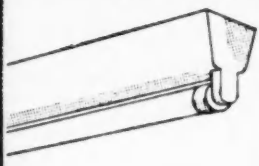

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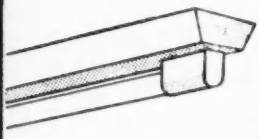

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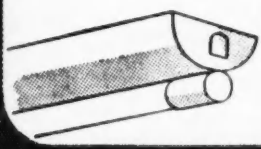

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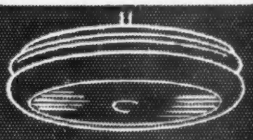

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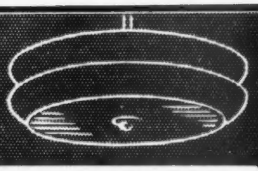

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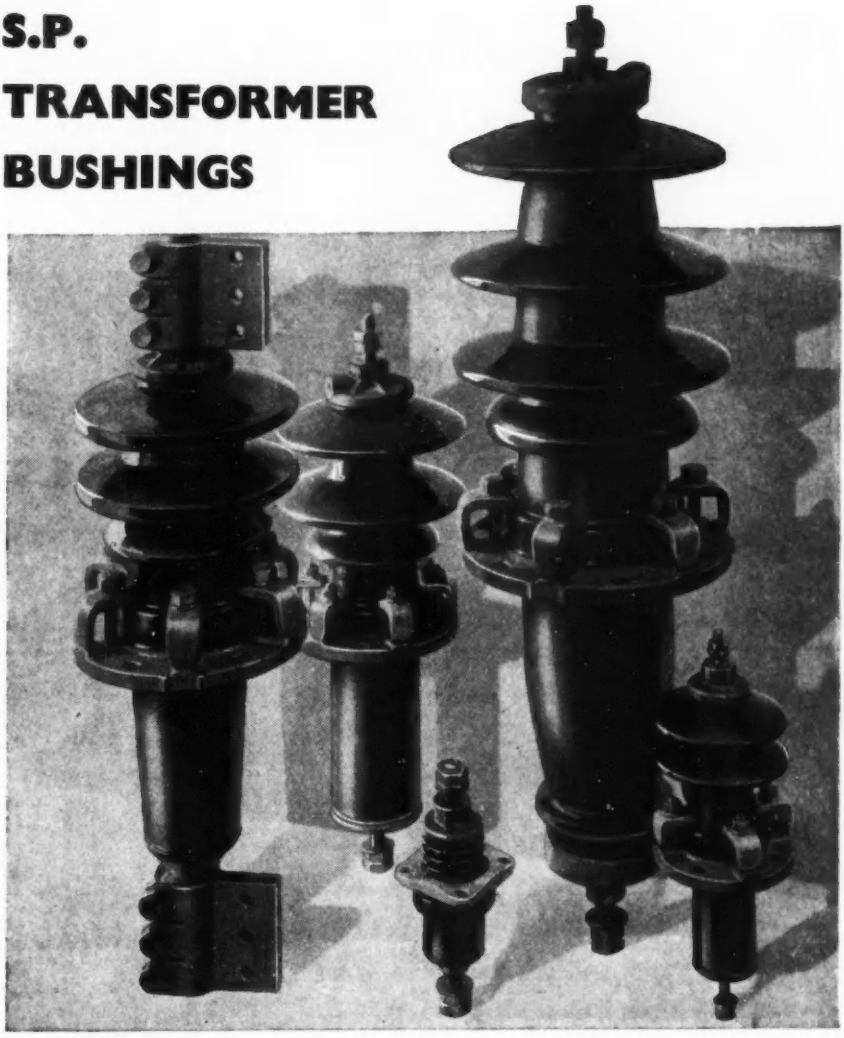

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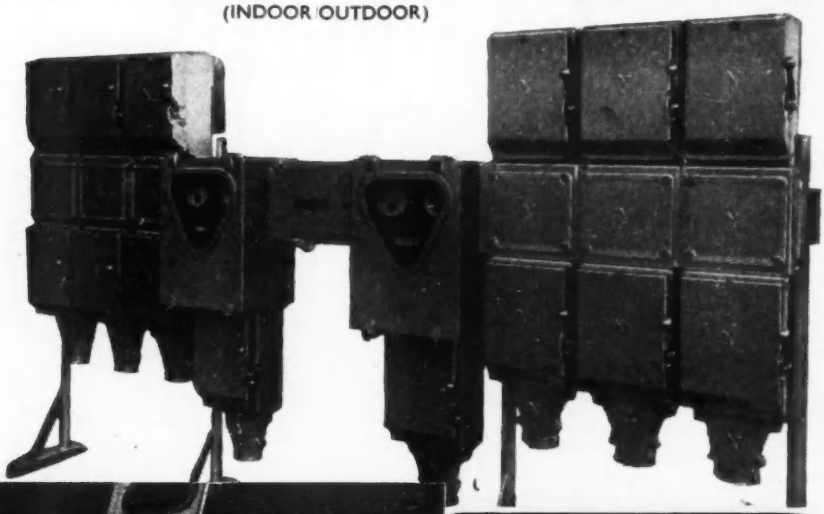

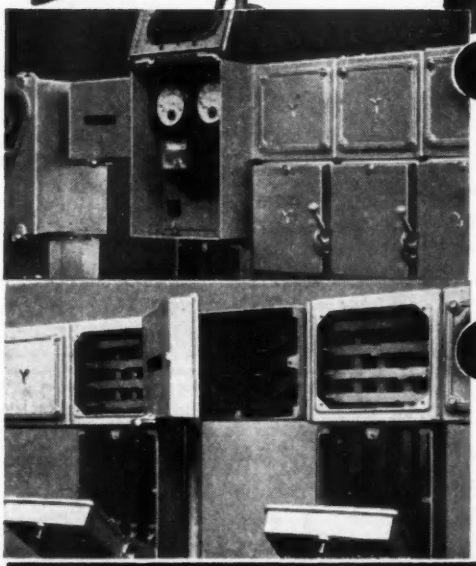

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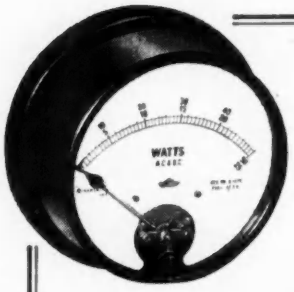

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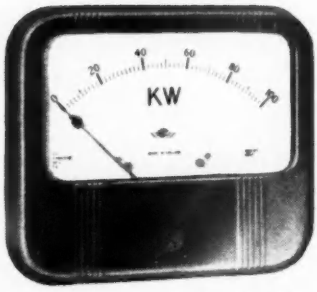

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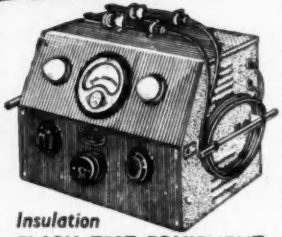

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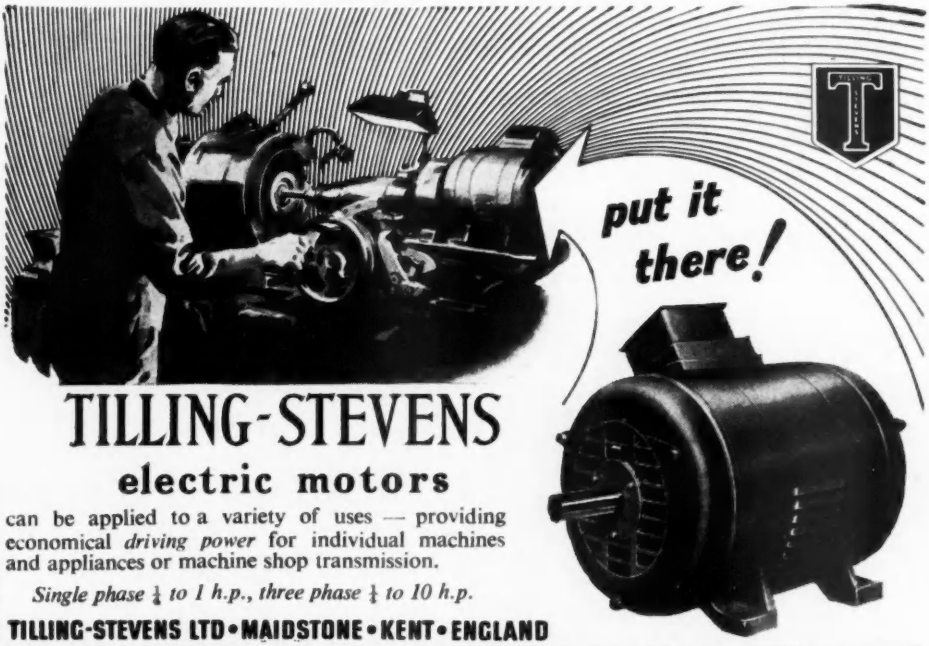

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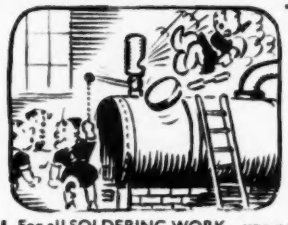

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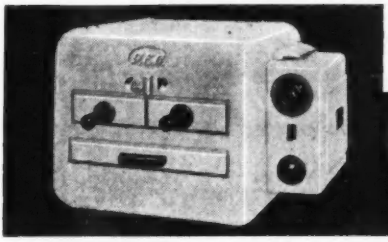

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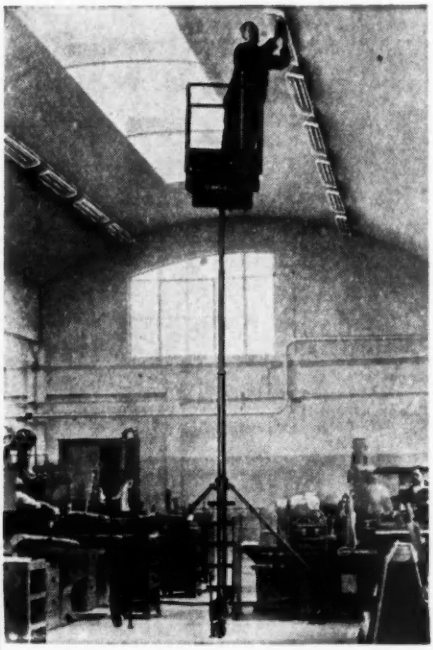

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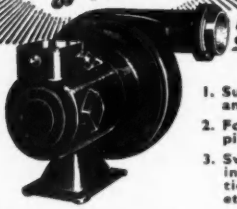

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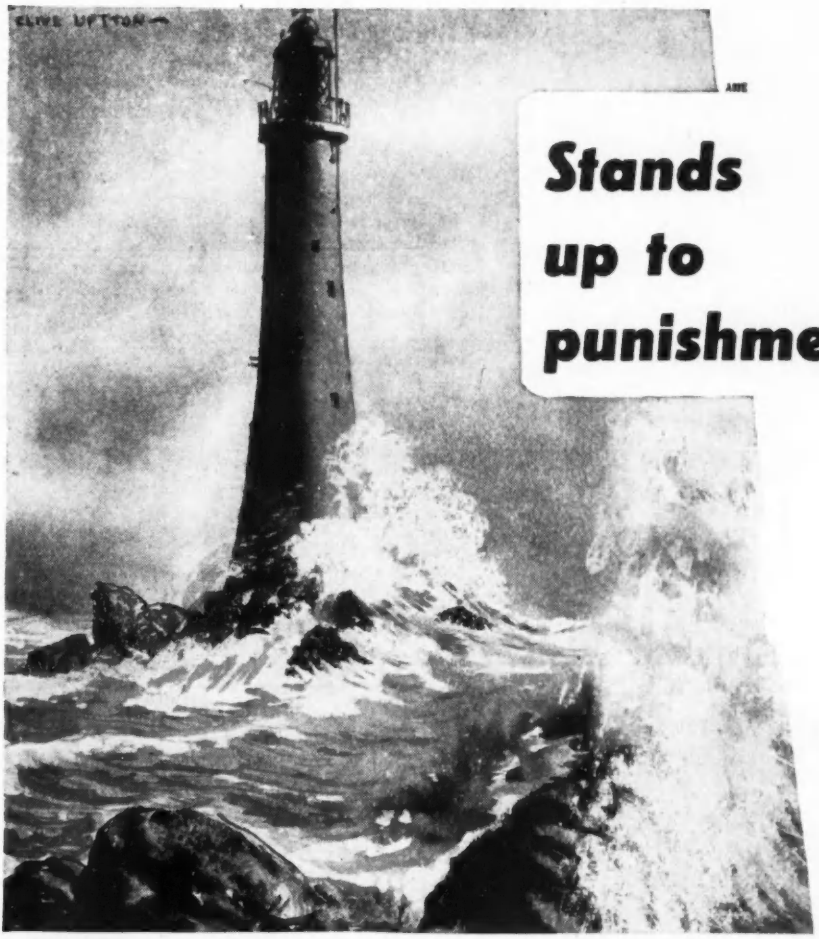

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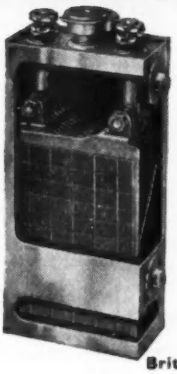

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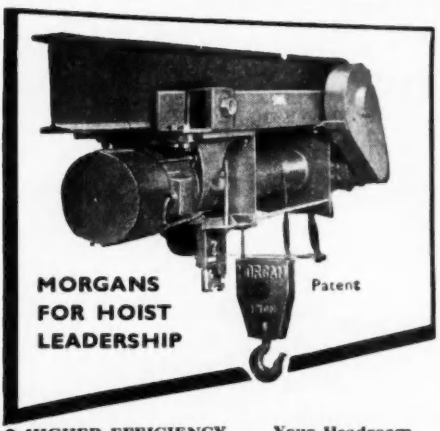

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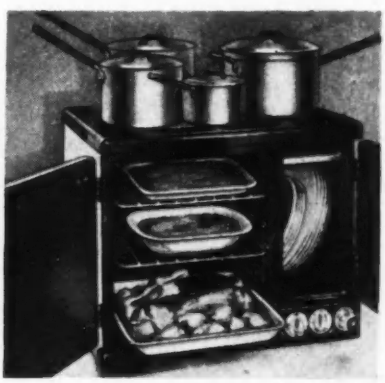

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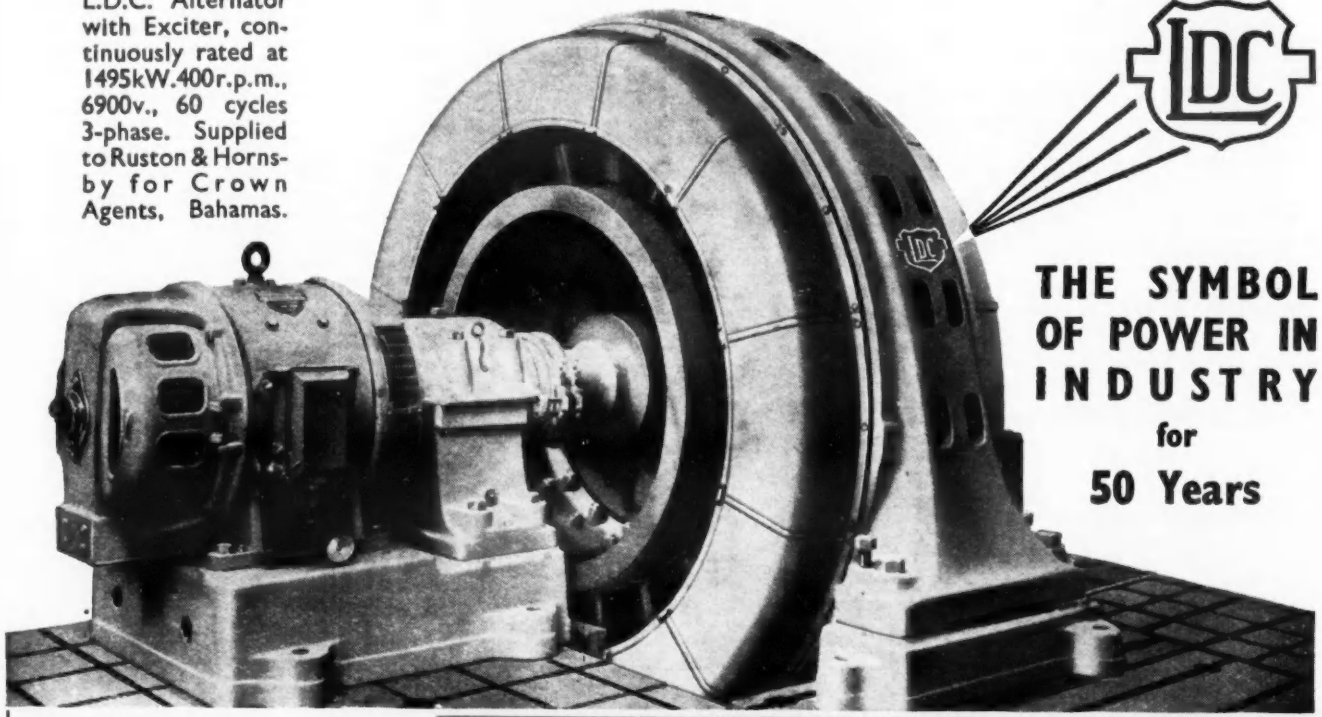

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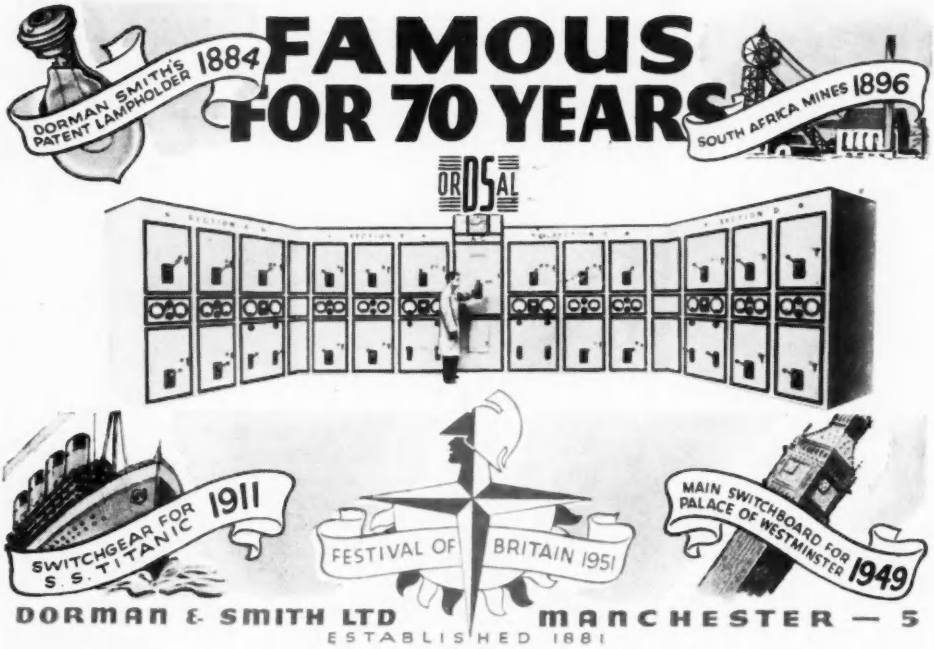
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